US-AEP

United States–Asia
Environmental Partnership

U.S. Environmental Industry Export Competitiveness in Asia

An analysis of the market share of environmental goods exports to U.S.-AEP presence countries by U.S. industry as compared with fourteen major competitor countries. The analysis uses OECD trade statistics data for over seventy harmonized tariff codes identified by U.S. Department of Commerce as characterizing the environmental industry.

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Forward

As a service to the US environmental industry, the United States-Asia Environmental Partnership (US-AEP) has commissioned this report to provide valuable market information on the environmental goods import market in Asia. This is likely the most detailed analysis of this type. There is a great deal of information to be digested in this report, and US-AEP itself will reference this data to draw conclusions which will help in developing strategies for particular countries and sectors. We hope that US industry will be able to use the analysis to make more informed decisions about their own market strategies. The ultimate objective is to mobilize the US environmental industry to address Asia's technology transfer needs while also benefiting the US economy.

The Methodology

The analysis uses a list of Harmonized System (HS) codes generated by the Department of Commerce's Environmental Technologies Industry Office to capture the environmental goods market. There are several underlying problems with using this type of data. One is that it does not include services (i.e., consulting and engineering) which are a significant part of this market. Second, the HS codes only go to the six digit level, which means that the net is cast much wider than desirable. Third, the environmental sector is a notoriously difficult sector to define, as exposed quite clearly by this analysis. For all of these reasons, the analysis as an indication of US market share of the environmental sector should be viewed cautiously. For example, the HS codes of the Heat Management and Renewable Energy sector and the Solid and Hazardous Waste sectors don't appear to characterize the industries as well as the other sectors due to the inclusion of large volume of goods associated with the semiconductor industry. Due to this fact, the overall market analysis is less reliable than the individual sector analyses. Also, the analysis probably gives a better perspective on market share than on market size.

That said, this is groundbreaking work that we hope will serve US-AEP and the US environmental business community well. It should serve very well as a foundation upon which to perform more detailed analysis in the future. This future analysis will almost certainly require redefining the set of HS codes.

The Results

Following are a few interesting results from the report. There will certainly be many more results that your company or organization will find compelling, depending on your country or sector specific interests. If there is specific data not found in the report, it may be available by contacting US-AEP.

- One of the most interesting results of the analysis is that the US remains very competitive in Asia. Not surprisingly, the analysis shows the US losing its position as the worldwide market leader to the Japanese in the US-AEP countries. However, the US is the second largest exporter of environmental goods with 26% of the import market for US-AEP countries. Furthermore, the US is one of only two countries that has increased its environmental exports to these countries in the face of overall declining imports between 1995 and 1999.
- The major US competitors in US-AEP countries are, in rank order: Japan, Germany, Taiwan, Italy, UK, China, Korea and France. The other countries (Australia, Netherlands, Sweden, Denmark, Austria, and Canada) had only negligible market shares.
- The ranking by total environmental goods import market of US-AEP countries (1995-1999) is: Korea (23%), Taiwan (20%), Hong Kong (14%), Singapore (12%), Malaysia (8%), Thailand (8%), Philippines (5%), India (5%), Indonesia (5%), Vietnam (1%), and Sri Lanka (<1%).
- As expected, the US performs very well in Air Pollution Sector, with 30% import market share in 1999 to US-AEP countries. Japan is the leading exporter to these countries, as would be expected, but Germany is surprisingly a distant third with only 13% of the market. The data also contradicts a common belief that China and Taiwan are capturing an increasing share of the Air Pollution market in US-AEP countries; combined, they only have 3% of the market.
- The US also performs well in the Monitoring and Analysis sector with 35% of the import market in US-AEP countries for 1999. Japan, while capturing a larger share of the market (37%) has had declining market share since 1995 while the US has consistently gained market share over the same period.
- The Wastewater Management Equipment import market in US-AEP countries is much more evenly divided, or competitive, than other sectors. While Japan captures a large share (34%), the rest of the market is divided amongst the US (16%), Germany (13%), Korea (10%), Taiwan (8%) and the UK (5%).

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Chapter 1. Introduction

The objective of this report is to evaluate U.S. environmental industry competitiveness in specific market sectors: Monitoring and Analysis, Air Pollution Control, Solid Waste Management, Waste Water Management, and Heat/Energy Management and Renewable Energy Plants. The results of this analyses will highlight areas of relative strength and weakness of U.S. environmental exports within the US-AEP countries: Korea, Hong Kong, Taiwan, Philippines, Indonesia, Singapore, Vietnam, Malaysia, Thailand, Sri Lanka, and India. These results are to help guide the efforts and attentions of both U.S. private industry and the United States- Asia Environmental Partnership (US-AEP).

In order to evaluate U.S. environmental trade performance, this report utilizes trade statistics provided by the Organization for Economic Cooperation and Development (OECD) in conjunction with an analysis of "environmental" HS codes by the Department of Commerce's Office of Environmental Technologies Industries (ETI). The codes provided by ETI to US-AEP in March 2001 were identified as the "List of Priority Environmental Products for Market Access" (dated 15 September 2000) and were developed initially for the purposes for the APEC negotiations. ETI developed this list with extensive input from the ETTAC advisory committee, major environmental associations, input generated through multiple federal register notices as well as general industry contacts. Similar work is continuing in other fora like the NAICs negotiations (North American Industry Classification) where they are attempting to give specific codes to the environmental sector.

Hereafter referred to as OECD/ETI data, the statistics are based on approximately seventy Harmonized Tariff System (HS) codes allocated to various sectors that are believed to capture a significant portion of environmental trade activity. Annual data analyzed for this report cover the period from 1995 to 1999, the most recent year for which data are currently available. The export trade statistics for 2000 should be available in the final quarter of 2001. The OECD/ETI data provide U.S. dollar values of goods and services as measured at the point of export.

Analyzing trade statistics is a careful endeavor – *caveat emptor* rules the day. Clearly the benefits of using the OECD data include: 1) consistent comparison of export activity from year to year and country to country, 2) actual sales as opposed to estimates, and 3) the data can be collected in a similar way across many different countries with wildly different policies for releasing economic information. Although the OECD data does represent the state of the art for statistical information describing actual trade flows of goods and services, the data are less robust when it comes to the specific task of describing environmental goods and services. Uniformity of reporting by all countries in the HS is achieved only as far as the 6-digit HS level. At this level some may argue that the categories may also contain goods and/or services that may not be considered environmental if more stringent definitions were applied. Conversely, some may argue that goods and services that otherwise are demonstrably environmental may not be captured at all in this analysis because those goods fell outside of the 6-digit HS categories selected for this analysis. For the data that are included in this introduction, we used the totality of the harmonized codes and show the values as assigned to each sector. However, in the sector specific analyses, we made a couple of judgment calls as the efficacy of the HS codes in developing a meaningful analysis. For example, in the potable water sector, there were only two of the priority HS codes assigned to this sector. One of those codes two codes we felt was too encompassing and accounted for more than 90% of the sector. As a result, we did not cover this sector at this time. Similarly, in the Waste Water Management sector, we noted that a particular code was also too encompassing and removed this data from our analysis of the Waste Water Management sector.

Although indigenous production is not included, OECD data are particularly valuable when analyzed for market share and how market shares change over time. The overall picture that emerges from these data is reasonably accurate and constitutes a very valuable resource for U.S. industry and for US-AEP. This view is supported by the fact that the data are in general agreement with other, independently derived sources of information including previously published studies, e.g. Environmental Business International (EBI), ThomasAssociates, The MacIlvaine Company and OECD.

Chapter 2. Executive Summary

2.1 The U.S. Is a Leader in Global Total Environmental Trade

There is no question that U.S. environmental companies are leaders in global environmental markets and the data indicates that the dominance is expanding. The global environmental export market for the US and its competitors has grown by almost $11 billion since 1995 to $122 billion in 1999 (see Figure 2.1). Of that $11 billion increase, the US captured 70% of it ($7.5 billion).

In 1999 the U.S., with $32 billion in export value, captured 26% of the export market share. The U.S. is followed by Germany and Japan with 19% and 15% respectively. Between 1995 and 1999, only the U.S. has shown an increase in market share - from 22% in 1995 to 26% in 1999. In contrast, the combined market share of the European competitors has decreased from 51% in 1995 to 49% in 1999. Japan saw a similar decline from 18% market share in 1995 to 15% market share in 1999.

Figure 2.1 Major Country of Origin by Total Environmental Export Value, 1995-1999

COUNTRY OF ORIGIN	1995	1996	1997	1998	1999
U.S.	24,154,176	26,022,035	29,753,136	29,221,999	31,640,814
Germany	20,968,432	21,421,020	21,443,363	22,903,776	22,750,344
Japan	20,420,051	19,173,701	19,123,282	15,718,308	18,473,714
Italy	9,577,308	10,588,156	9,721,260	9,648,438	9,379,634
U.K.	7,704,362	8,489,168	9,733,923	9,345,427	8,831,728
France	6,911,658	7,171,536	7,139,424	7,608,688	7,422,115
Netherlands	4,083,080	4,100,941	3,718,937	3,608,891	3,828,004
Canada	2,171,826	2,579,839	2,863,348	3,086,152	3,370,367
Sweden	2,851,624	2,749,520	2,524,475	2,964,757	2,972,644
China	2,296,591	2,458,176	2,948,357	2,812,032	2,880,849
Taiwan	2,727,978	2,930,984	2,654,270	2,746,039	2,804,247
Denmark	2,722,668	2,687,156	2,486,263	2,608,142	2,768,815
Austria	1,936,112	1,942,525	1,805,323	2,018,246	2,077,876
Korea	1,862,678	2,103,878	2,477,228	1,939,701	2,047,498
Australia	674,456	793,080	752,515	814,203	697,888
Grand Total	111,062,999	115,211,715	119,145,105	117,044,798	121,946,536

Global Environmental Exports increased by 10% ($11 billion) since 1995

US Environmental Exports increased by 31% ($7.5 billion) from 1995 to 1999.

The U.S. $7.5 billion increase accounts for nearly 70% of the total increase worldwide.

All values in thousands (000's) of US dollars

Figure 2.2 Major Country of Origin by Environmental Export Market Share, 1995-1999

COUNTRY OF ORIGIN	1995	1996	1997	1998	1999
U.S.	22%	23%	25%	25%	26%
Germany	19%	19%	18%	20%	19%
Japan	18%	17%	16%	13%	15%
Italy	9%	9%	8%	8%	8%
U.K.	7%	7%	8%	8%	7%
France	6%	6%	6%	7%	6%
Netherlands	4%	4%	3%	3%	3%
Canada	2%	2%	2%	3%	3%
Sweden	3%	2%	2%	3%	2%
China	2%	2%	2%	2%	2%
Taiwan	2%	3%	2%	2%	2%
Denmark	2%	2%	2%	2%	2%
Austria	2%	2%	2%	2%	2%
Korea	2%	2%	2%	2%	2%
Australia	1%	1%	1%	1%	1%
Grand Total	100%	100%	100%	100%	100%

Between 1995 and 1999, only the U.S. has shown an increase in market share - from 22% in 1995 to 26% in 1999.

In contrast, the combined market share of the European competitors has decreased from 51% in 1995 to 49% in 1999.

Japan saw a similar decline from 18% market share in 1995 to 15% market share in 1999.

2.2 US-AEP Imports of Environmental Equipment

The total value of US and major competitor exports to US-AEP countries have not reached the levels that prevailed prior to the onset of the currency crisis in 1997. In 1999, export values to US-AEP countries increased by 15% over 1998. However, that is still 7% less than in 1995 – and 12% less than 1997. During the period 1995-1999, total export value to US-AEP countries by the US and its competitors was almost $117b. The largest import market over this period was Korea ($26.6b) which accounted for 23% of the total export value. In 1995 and 1996, export value to Korea was $6.8b and $7.3b, respectively. These were the highest levels achieved by any US-AEP country. The highest level for Taiwan, the import market leader in the last two years, reached $6.1b in 1999 – still $1.2b short of Korea's high in 1996. Philippines and Taiwan show the strongest overall growth 1995 to 1999.

Figure 2.3 US-AEP Imports by Destination Country, 1995-1999

	1995	1996	1997	1998	1999	Total 1995-1999	% 1995-1999
Hong Kong	3,141,701	3,185,412	3,586,066	3,152,953	3,265,912	16,332,045	14.0%
Indonesia	1,176,904	1,490,689	1,468,175	720,709	589,932	5,446,409	4.7%
India	1,213,952	1,249,763	934,604	1,202,733	893,848	5,494,900	4.7%
Korea	6,783,191	7,295,517	5,940,780	2,557,224	3,991,134	26,567,846	22.8%
Sri Lanka	60,944	56,946	69,295	60,085	57,508	304,779	0.3%
Malaysia	2,279,691	1,973,302	2,115,871	1,573,486	1,674,705	9,617,054	8.2%
Philippines	868,204	1,044,528	1,393,312	1,424,971	1,437,022	6,168,038	5.3%
Singapore	2,723,025	2,768,160	2,961,305	2,569,890	2,813,523	13,835,904	11.9%
Thailand	2,215,672	2,129,117	2,010,811	1,176,429	1,302,480	8,834,509	7.6%
Taiwan	3,492,531	3,772,133	4,636,978	4,813,812	6,104,378	22,819,833	19.5%
Vietnam	203,022	291,678	276,412	273,578	278,041	1,322,731	1.1%
Total by Year	24,158,838	25,257,246	25,393,609	19,525,871	22,408,483	116,744,047	100.0%

All values in thousands (000's) of US dollars

2.3 US and Competitor Exports of Environmental Equipment to US-AEP Countries

This figure shows that Japan and the US control 66% of the market. Japan, although down 13% from 1995 levels, is still the dominant player in the US-AEP markets. The US appears to have weathered the effects of the financial crisis well, showing a 16% growth rate since 1995 in the face of a 7% decline in exports to the region. This appears to be contrary to the stereotype of US firms unable to sustain operations in unfriendly markets. Besides the US, only Korea and Austria show positive growth rates.

Figure 2.4 US-AEP Country Environmental Imports by Country of Origin, 1995-1999

	1995	1996	1997	1998	1999	Total 1995-1999	% 1995-1999
Japan	10,393,129	9,885,264	9,740,090	6,848,030	9,044,638	45,911,151	39.3%
US	5,629,507	6,324,725	6,953,501	5,562,612	6,543,253	31,013,598	26.6%
Germany	1,930,137	2,159,715	2,043,205	1,674,489	1,729,793	9,537,340	8.2%
Taiwan	1,293,515	1,391,989	1,232,855	1,158,833	1,239,123	6,316,315	5.4%
Italy	1,017,756	1,188,115	981,214	686,019	554,216	4,427,319	3.8%
UK	853,687	972,426	1,024,351	847,973	696,490	4,394,927	3.8%
China	776,529	796,590	1,042,488	735,526	704,752	4,055,885	3.5%
Korea	551,764	856,299	737,367	591,935	628,186	3,365,551	2.9%
France	536,128	586,073	619,688	477,124	412,473	2,631,486	2.3%
Australia	205,232	231,023	228,669	295,661	149,030	1,109,614	1.0%
Netherlands	254,792	266,167	213,562	170,613	188,103	1,093,238	0.9%
Sweden	221,468	227,843	219,847	207,175	196,114	1,072,447	0.9%
Denmark	297,376	154,941	116,368	101,448	89,585	759,719	0.7%
Austria	109,696	101,701	84,887	84,006	160,473	540,764	0.5%
Canada	88,124	114,375	155,515	84,425	72,255	514,694	0.4%
Total by Year	24,158,838	25,257,246	25,393,609	19,525,871	22,408,483	116,744,047	100.0%

All values in thousands (000)

2.4 US-AEP Environmental Imports by Environmental Sector

The total global export value of the US and its major competitors from 1995-1999 (cumulative) was $568b. Of this amount, 21% went to US-AEP countries. As noted earlier, export values to US-AEP countries have decreased since 1995 despite the increase in global exports. In 1999, US-AEP countries accounted for only 19% of global export value – down from 22% in 1995. Comparing 1995 data with 1999, every sector is down except for the HE/REP sector, which rose by 27%. The next strongest sector is SH/ORC/RC, which, in 1999, was within 4% of 1995 levels.

Figure 2.5 US-AEP Environmental Imports by Environmental Sector and Destination Country, 1995-1999

	World Wide	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philip-pines	Singapore	Thai-land	Taiwan	Vietnam	Total to AEP Countries
APC	29,803	348	276	265	701	10	338	242	474	430	833	46	3,964
HE/REP	36,096	1,828	496	837	1,536	15	1,138	1,220	1,268	673	1,061	50	10,121
MA	206,994	3,754	1,134	1,981	9,764	78	2,908	1,476	4,907	2,655	7,164	215	36,039
SH/OR/RC	126,134	3,190	1,738	1,327	9,778	51	3,180	1,778	3,981	2,763	10,210	347	38,341
PWT	42,175	814	440	434	2,226	27	991	689	1,525	723	1,568	84	9,521
WWM	126,808	6,398	1,362	651	2,562	123	1,061	763	1,681	1,592	1,983	582	18,758
Grand Total for Sectors	568,010	16,332	5,446	5,495	26,568	305	9,617	6,168	13,836	8,835	22,820	1,323	116,744

All values in millions (000,000) of US dollars

Figure 2.6 Change in US-AEP Environmental Imports by Environmental Sector, 1995 vs. 1999

SECTOR	1995	1999	Increase/Decrease (1999 less 1995)	% Change
APC	879,401	618,523	(260,878)	-30%
HE/REP	1,874,822	2,170,018	295,196	16%
M/A	7,302,020	6,826,511	(475,509)	-7%
SH/ORS/RC	8,254,156	7,917,592	(336,565)	-4%
PWT	1,840,549	1,739,604	(100,945)	-5%
WWM	4,007,890	3,136,236	(871,654)	-22%
Total	24,158,838	22,408,483	(1,750,355)	-7%

Legend:
APC = Air Pollution Control
HE/REP = Heat and Energy Management/Renewable Energy
MA = Monitoring and Analysis
SH/OR/RC = Solid and Hazardous Waste/Other Recycling Systems/Remediation and Clean Up
PWT = Potable Water Treatment[1]
WWM = Waste Water Management

[1] The Potable Water Treatment sector was not covered in the following analyses.

Worldwide exports of environmental goods and services amounted to approximately $122 billion in 1999. The U.S. is the leading environmental exporter with nearly $32 billion of export value, which corresponds to a 26% share of global environmental export trade. The U.S. is followed by Germany and Japan with 19% and 15% shares respectively. Between 1995 and 1999, U.S. market share increased steadily from 22% to 26%. Over the same period, declines in market share were spread across other competitors, with Japan suffering the greatest decline in market position.

But U.S. dominance in global environmental markets does not hold uniformly across all environmental sectors or geographic markets. U.S. export performance among the US-AEP economies has been very mixed depending on the specific types of environmental goods and the specific economies to which those exports are flowing.

2.5 Air Pollution Control Equipment

In the APC sector, the U.S. also enjoys a global leadership position with a market share of approximately 27%. German and Japanese competitors trail with 24% and 10% respectively.

Across the US-AEP economies, however, U.S. APC suppliers are highly threatened by Japanese companies who have led the regional APC export market for three of the last five years. In 1999, the Japanese market share of 31% surpassed the U.S. share at 30%. Both were trailed by Germany, which captured 13% of the market in the same year.

Within the individual US-AEP economies, U.S. APC export performance has been even more mixed. In Sri Lanka and Singapore, where total APC import markets have been growing, not only have U.S. companies seen their exports increase along with the overall market but have even gone on to capture a growing share of the newly expanded pie. However, in other similarly expanding APC export markets, such as Vietnam, Philippines and Hong Kong, U.S. vendors have actually seen their positions slip. U.S. performance has been similarly inconsistent among the remaining US-AEP economies where total APC import markets have been contracting.

Figure 2.1 APC Export Market Growth and U.S. Market Share Growth

	1999 Import APC Market Size (US$K)	1999 U.S. APC Market Share (%)	Percent Change in Total APC Import Market (1995-1999)	Percent Change in U.S. APC Market Share (1995-1999)
Hong Kong	76,059	29%	20%	-6%
India	50,328	33%	-11%	94%
Indonesia	22,215	28%	-66%	4%
Korea	69,800	37%	-62%	16%
Malaysia	43,086	29%	-57%	101%
Philippines	48,027	19%	46%	-12%
Singapore	87,932	47%	16%	23%
Sri Lanka	2,991	7%	51%	100%
Taiwan	154,497	25%	-8%	-30%
Thailand	55,902	19%	-56%	-7%
Vietnam	7,687	6%	76%	-60%

2.6 Heat & Energy Management and Renewable Energy Plants

In the combined sector of HE/REP, the U.S. holds a global position of second place behind the Japanese who enjoyed a cumulative global market share of 21% between 1995 and 1999. The U.S. and Germany trailed with 19% and 13% respectively.

Across the US-AEP economies, U.S. HE/REP suppliers fall even further behind the Japanese who dominated regional HE/REP exports with a 43% cumulative share during the period. The U.S. and Germany trailed far behind with 20% and 8% shares respectively. However, in looking at year-to-year performance, the U.S. saw significant competitive improvements while the Japanese position held roughly steady.

Within the individual US-AEP economies, U.S. HE/REP export performance has been extremely mixed. In Hong Kong, the Philippines and to a lesser degree Malaysia, rapidly growing markets have been accompanied by dramatic improvements in U.S. competitiveness. At the other extreme, Sri Lanka, where overall import markets also increased, saw U.S. exports drop to zero. In Thailand, Indonesia and Korea, markets have contracted and so has U.S. performance.

Figure 2.2 HE/REP Export Market Growth and U.S. Market Share Growth

	1999 HE/REP Import Market Size (US$K)	1999 U.S. HE/REP Market Share (%)	Percent Change in Total HE/REP Import Market (1995-1999)	Percent Change in U.S. HE/REP Market Share (1995-1999)
Hong Kong	530,169	10%	83%	194%
India	112,515	13%	-61%	276%
Indonesia	51,988	17%	-31%	-52%
Korea	260,105	5%	-28%	-64%
Malaysia	260,549	27%	44%	66%
Philippines	337,934	63%	321%	211%
Singapore	259,392	19%	0%	30%
Sri Lanka	5,353	0%	487%	-100%
Taiwan	226,461	17%	42%	-28%
Thailand	109,785	6%	-36%	-8%
Vietnam	15,767	3%	88%	-65%

2.7 Monitoring & Analysis Equipment

In the M&A sector, the U.S. also enjoys a global leadership position with a market share of approximately 30%. German and Japanese competitors trail with 21% and 15% respectively.

Across the US-AEP economies, however, U.S. M&A suppliers trail behind Japanese companies who have dominated the regional M&A export market for each of the last five years. But despite the historical success of Japanese suppliers in these markets, the margin enjoyed by the Japanese has shrunk consistently and dramatically over the same five-year period. In 1995, Japanese and U.S. market shares were 45% and 28% respectively. By 1999, the Japanese market share of 37% was only marginally larger than the U.S. share of 35%. Both were trailed by Germany, which held steady throughout the period with a 10%-11% market share. When looking at specific M&A commodities, Japanese suppliers dominated three of the five largest commodity categories in 1999.

Within the individual US-AEP economies, U.S. M&A performance has been mixed. In six of the US-AEP economies (Philippines, Taiwan, Vietnam, Hong Kong, Singapore and India), total M&A import markets have been growing at various levels. In four of those economies, not only have U.S. companies seen their exports increase along with the overall market but have even gone on to capture a growing share of the newly expanded pie. However, in two other similarly expanding M&A export markets (Philippines and, to a lesser degree, India), U.S. vendors have actually seen their positions slip. In the remaining countries of Thailand, Korea, Indonesia, Malaysia and Sri Lanka, import markets have contracted but U.S. competitiveness has generally increased (with the exception of Indonesia where the U.S. position weakened somewhat).

Figure 2.3 M&A Export Market Growth and U.S. Market Share Growth, 1995-1999

	1999 M&A Import Market Size (US$K)	1999 U.S. M&A Market Share (%)	Percent Change in Total M&A Import Market (1995-1999)	Percent Change in U.S. M&A Market Share (1995-1999)
Hong Kong	782,883	31%	16%	4%
India	388,750	23%	6%	-5%
Indonesia	107,652	11%	-52%	-6%
Korea	1,417,377	37%	-40%	65%
Malaysia	554,798	41%	-19%	34%
Philippines	353,579	29%	57%	-22%
Singapore	1,088,821	46%	17%	11%
Sri Lanka	12,986	8%	-28%	81%
Taiwan	1,629,064	32%	42%	6%
Thailand	447,620	28%	-28%	35%
Vietnam	42,981	12%	30%	121%

2.8 Solid & Hazardous Waste, Other Recycling Systems and Remediation and Cleanup

In the combined sector of SWM/ORS/RC, the U.S. is the second largest global exporter behind Japan. Between 1995 and 1999, Japan achieved a cumulative market share of 26% while the U.S. followed at 24%. However, in 1989 and 1999, the most recent years for which data are available, the U.S. actually matched or exceeded Japanese performance. During the 1995-99 period, Germany and Italy held 16% and 11% market shares respectively.

Across the US-AEP economies, U.S. SWM suppliers fell well behind their Japanese counterparts who dominated regional SWM exports with a 48% cumulative share during the 1995-99 period. The U.S. trailed at 28%, followed distantly by Germany and Italy at 6% and 5% respectively. Despite the relatively poor performance of the U.S. during the period overall, the U.S. position steadily improved year to year. In contrast, Japanese market share saw slight declines.

Within the individual US-AEP economies, U.S. SWM export performance has been very mixed - declining in five of the economies while improving in the remaining six. The U.S. made its greatest competitive gain (60%) in Singapore where the size of overall SWM import market held steady between 1995 and 1999. Singapore is also the market where the U.S. enjoyed its greatest market share in 1999. The U.S. suffered its largest decline in the Philippines where the import market actually grew at the greatest rate among all the US-AEP countries. In the largest markets (Korea and Taiwan), the U.S. saw market share improvements of 15% and 17% respectively on top of the already strong U.S. position in both those economies.

Figure 2.4 SWM/ORS/RC Export Market Growth and U.S. Market Share Growth, 1995-1999

	1999 SWM Import Market Size (US$K)	1999 U.S. SWM Market Share (%)	Percent Change in Total SWM Import Market (1995-1999)	Percent Change in U.S. SWM Market Share (1995-1999)
Hong Kong	653,653	10%	4%	-12%
India	159,188	12%	-45%	-8%
Indonesia	168,332	9%	-58%	4%
Korea	1,534,686	40%	-44%	15%
Malaysia	463,996	18%	-49%	6%
Philippines	378,730	14%	22%	-55%
Singapore	782,625	42%	-1%	60%
Sri Lanka	8,941	9%	-3%	20%
Taiwan	3,351,765	36%	141%	17%
Thailand	362,217	9%	-50%	-14%
Vietnam	53,460	5%	-12%	-25%

2.9 Wastewater Management Equipment

In the WWM equipment sector, the U.S. is the second largest exporter behind Germany. Between 1995 and 1999, Germany achieved a cumulative market share of 26% while the U.S. followed at 18%. However, during the same period, U.S. market share was increasing while German (and Japanese) market share was falling.

Across the US-AEP economies, German WWM equipment suppliers are ranked third while Japan is the market leader with a 34% share. The U.S., still in second place, held an average market share of 16% during the 1995-1999 period. But again, the U.S. saw market share growing during the period while the market leader (now Japan) saw its position slip.

Within the individual US-AEP economies, U.S. WWM equipment export performance has been largely positive. Exceptions include Malaysia and the Philippines where U.S. market share declined between 1995 and 1999.

Figure 2.5 WWM Equipment Export Market Growth and U.S. Market Share Growth, 1995-1999

	1999 WWM Import Market Size (US$K)	1999 U.S. WWM Market Share (%)	Percent Change in Total WWM Import Market (1995-1999)	Percent Change in U.S. WWM Market Share (1995-1999)
Hong Kong	356,190	9%	-24%	8%
India	80,965	20%	-24%	66%
Indonesia	128,905	6%	-49%	45%
Korea	277,032	24%	-49%	15%
Malaysia	116,343	16%	-4%	37%
Philippines	61,521	18%	-7%	-19%
Singapore	134,889	25%	-33%	40%
Sri Lanka	11,880	8%	-40%	114%
Taiwan	276,269	25%	-5%	30%
Thailand	121,829	15%	-56%	56%
Vietnam	88,867	1%	53%	-17%

US-AEP

United States–Asia Environmental Partnership

U.S. Environmental Industry Export Competitiveness

Chapter 3. Air Pollution Control

October 2001

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3.1 Executive Summary

The objective of this report is to evaluate U.S. environmental industry competitiveness specifically in the market segment of air pollution control (APC) equipment. The results of this analysis will highlight areas of relative strength and weakness of U.S. APC environmental exports within the US-AEP countries: Korea, Hong Kong, Taiwan, Philippines, Indonesia, Singapore, Vietnam, Malaysia, Thailand, Sri Lanka, and India. These results are to help guide the efforts and attentions of both U.S. private industry and the United States- Asia Environmental Partnership (US-AEP).

U.S. companies accounted for approximately 25% of the total value of environmental exports worldwide in 1999. In the same year, German and Japanese competitors captured market shares of 19% and 15% respectively. In the air pollution control sector, the U.S. also enjoys a global leadership position with a market share of approximately 27%. German and Japanese competitors trail with 24% and 10% respectively.

In Asia, however, U.S. APC suppliers are highly threatened by Japanese companies who have led the regional APC export market for three of the last five years. In 1999, the Japanese market share of 31% surpassed the U.S. share at 30%. Both were trailed by Germany, which captured 13% of the market in the same year.

Within the individual US-AEP countries, U.S. APC export performance has been even more mixed. In Sri Lanka and Singapore, where total APC import markets have been growing, not only have U.S. companies seen their exports increase along with the overall market but have even gone on to capture a larger share of the growing export market. However, in other similarly expanding APC export markets, such as Vietnam, Philippines and Hong Kong, U.S. vendors have actually seen their positions slip in 1999. In contracting markets, the US has gained market share in India, Indonesia, Korea, and Malaysia but have declined in Taiwan and Thailand.

3.2 The U.S. Is a Leader in Global Air Pollution Control Trade

The global export market for APC equipment was approximately $6 billion in 1999 (Figure 3.1). The top six exporters (U.S., Germany, U.K., France, Japan and Canada) accounted for 84% of total APC exports worldwide in 1999. The U.S. is the leading APC exporter with nearly $1.7 billion of total APC export value. EBI estimates are even higher; EBI estimates that APC exports are $3.6 billion for U.S. firms.

Figure 3.1 Global APC Export Value by Major Country of Origin, 1995-1999

COUNTRY OF ORIGIN	Total 95	Total 96	Total 97	Total 98	Total 99	Total 1995-1999
U.S.	1,315,053	1,403,246	1,801,116	1,595,821	1,697,982	7,813,218
Germany	1,118,139	1,198,871	1,249,214	1,413,361	1,482,816	6,462,401
Japan	549,196	665,205	727,991	632,673	634,617	3,209,682
Italy	462,210	510,243	494,348	554,191	543,912	2,564,904
U.K.	762,253	645,557	544,056	480,329	501,939	2,934,134
France	256,064	324,676	262,982	282,639	331,185	1,457,546
Netherlands	240,094	364,601	270,526	234,388	265,005	1,374,614
Canada	163,116	132,598	162,250	191,238	173,810	823,012
Sweden	180,022	167,881	141,452	172,457	163,378	825,190
China	151,764	237,621	179,757	116,466	146,044	831,652
Taiwan	171,462	149,581	153,237	131,902	114,154	720,336
Denmark	22,539	21,142	27,336	34,990	53,813	159,820
Austria	30,298	41,352	48,385	43,245	53,681	216,961
Korea	18,276	33,798	23,828	27,505	36,434	139,841
Australia	69,785	72,927	59,971	48,404	18,869	269,956
Grand Total	5,510,270	5,969,299	6,146,450	5,959,610	6,217,638	29,803,267

All values in thousands (000's) of US dollars

Figure 3.2 shows the global 1999 APC export market share. The U.S. leads with a 27% share, followed by Germany and Japan with 24% and 10% respectively. The U.S. share has increased from 24% to 27% in 1999. Germany also saw significant improvements in market share, particularly in 1998 and 1999. Declines in market share over the same period have been spread across the other countries, with U.K. experiencing the greatest drop in share. The U.S. is maintaining its dominant position in the APC globally, continuing to hold its own against German and Japanese competitors.

Figure 3.2 Global APC Export Market Share by Major Country of Origin, 1995-1999

COUNTRY OF ORIGIN	Total 95	Total 96	Total 97	Total 98	Total 99	Total 1995-1999
U.S.	24%	24%	29%	27%	27%	26%
Germany	20%	20%	20%	24%	24%	22%
Japan	10%	11%	12%	11%	10%	11%
Italy	8%	9%	8%	9%	9%	9%
U.K.	14%	11%	9%	8%	8%	10%
France	5%	5%	4%	5%	5%	5%
Netherlands	4%	6%	4%	4%	4%	5%
Canada	3%	2%	3%	3%	3%	3%
Sweden	3%	3%	2%	3%	3%	3%
China	3%	4%	3%	2%	2%	3%
Taiwan	3%	3%	2%	2%	2%	2%
Denmark	0%	0%	0%	1%	1%	1%
Austria	1%	1%	1%	1%	1%	1%
Korea	0%	1%	0%	0%	1%	0%
Australia	1%	1%	1%	1%	0%	1%
Grand Total	100%	100%	100%	100%	100%	100%

3.3 Japan and the U.S. Share the Lead in APC Exports to US-AEP Counties

Figure 3.3 shows APC exports to US-AEP countries. The total US-AEP APC export market was approximately $618 million in 1999. This is down from $879.4 million in 1995. In 1999, Japan continues to be the leading exporter to US-AEP countries with almost $192 million in total APC export value. The U.S. follows closely with approximately $184 million in exports, very close to the EBI estimates of $200 million of U.S. exports going to the US-AEP countries in Asia.

Figure 3.3 APC Export Value by Major Country of Origin Across All US-AEP Countries, 1995-1999

COUNTRY OF ORIGIN	1995	1996	1997	1998	1999	Total 1995-1999
Japan	333,368	301,268	266,295	174,866	192,803	1,268,600
U.S.	243,461	287,350	283,815	207,903	183,840	1,206,369
Germany	103,404	131,850	111,520	89,137	77,631	513,542
U.K.	40,368	47,670	60,582	38,151	48,175	234,946
Taiwan	13,976	18,822	23,261	16,776	19,609	92,444
Italy	14,742	27,831	16,047	15,915	16,738	91,273
China	10,288	7,044	11,138	11,138	15,257	54,865
Netherlands	12,690	12,025	8,815	9,266	11,663	54,459
France	35,518	30,213	22,657	21,636	10,906	120,930
Sweden	8,731	8,145	16,572	10,834	10,776	55,058
Korea	4,713	13,535	8,614	11,640	10,380	48,882
Canada	8,264	6,190	13,178	13,126	6,760	47,518
Denmark	26,093	20,525	16,104	21,610	6,307	90,639
Australia	20,130	17,930	13,502	7,271	5,838	64,671
Austria	3,654	7,319	4,243	2,961	1,840	20,017
Grand Total	879,401	937,718	876,343	652,229	618,523	3,964,214

All values in thousands (000's) of US dollars

Figure 3.4 shows the total values converted to APC export market shares among US-AEP countries. The top six APC exporters (Japan, U.S., Germany, U.K., Taiwan, Italy and China) account for 90% of total APC exports to the US-AEP countries. Japan leads with a 31% share, followed closely by the U.S. at 30% and Germany with 13%. Between 1995 and 1999, the U.S. share has increased from 28% to 30%. During the same period, the market leader, Japan, saw a decrease in market share from 38% to 31%. The U.K. saw a significant increase from 5% to 8%. Other countries' performance was mixed.

Figure 3.4 APC Export Market Share by Major Country of Origin Across All US-AEP Countries, 1995-1999

COUNTRY OF ORIGIN	1995	1996	1997	1998	1999	Total 1995-1999
Japan	38%	32%	30%	27%	31%	32%
U.S.	28%	31%	32%	32%	30%	30%
Germany	12%	14%	13%	14%	13%	13%
U.K.	5%	5%	7%	6%	8%	6%
Taiwan	2%	2%	3%	3%	3%	2%
Italy	2%	3%	2%	2%	3%	2%
China	1%	1%	1%	2%	2%	1%
Netherlands	1%	1%	1%	1%	2%	1%
France	4%	3%	3%	3%	2%	3%
Sweden	1%	1%	2%	2%	2%	1%
Korea	1%	1%	1%	2%	2%	1%
Canada	1%	1%	2%	2%	1%	1%
Denmark	3%	2%	2%	3%	1%	2%
Australia	2%	2%	2%	1%	1%	2%
Austria	0%	1%	0%	0%	0%	1%
Grand Total	100%	100%	100%	100%	100%	100%

3.4 Various Opinions on U.S. Competitiveness in Asia

The OECD export data shows that the U.S. is a dominant player in global and specifically Asian environmental markets. However, within the APC market segment in Asia, the U.S. takes a second seat to the Japanese across the US-AEP countries, and is challenged by German exports in specific US-AEP countries. The OECD data indicates that the US is more competitive than has been reported elsewhere. For example, **ThomasAssociates** published a series of reports in 1999 that investigated U.S. market share and competitiveness analyzing import data from several US-AEP countries. These reports, titled “Asian Environmental Markets: High Priority Industries for U.S. Equipment and Service Companies,” basically echoed the fact that the Japanese have the lead position in APC markets and have maintained that position for some time. According to the report:

- **Hong Kong:** Japan dominates the air filtration equipment market, maintaining over 30% market share. The U.S. and Belgium are in the second level of market shareholders.
- **Malaysia:** Japan has a strong leading position in the imported air purification equipment market. Other U.S.-AEP countries including Taiwan, South Korea, and Thailand also actively export air purification equipment to Malaysia.
- **Korea**: Usually a distant second in the air filtration market share rankings, the U.S. had only a slight edge over Japanese manufacturers in 1997 and increased that edge 8% in 1998, even in the declining market.

Environmental Business International shed some light on how U.S. firms stack up against the Japanese and the Germans in the APC export markets. EBI rated each country's ability to compete in each of the major environmental market segments. As shown, the U.S. is rated "OG" which is between OK and Good. In contrast, both German and Japanese companies are rated "E" or excellent. In both of these countries the air quality regulations are at least as strict and in some cases stricter than in the U.S. Both German and Japanese vendors tend to have more expensive and higher quality technologies that customers in their domestic markets are forced to pay for. In particular, the monopolistic energy producers in Asia are some of the largest consumers of APC equipment. Because they are often public utilities, they can pass on the higher costs for more expensive German and Japanese APC equipment to their customers.

Figure 3.5 Relative Competitiveness of Environmental Exporters

Equipment	US	Germ	Japan	F&UK	Dev'g
Water Equipment & Chemicals	G	G	GE	GE	MP
Air Pollution Control	OG	E	E	O	MP
Instruments & Info. Systems	E	G	G	O	P
Waste Mgmt Equipment	G	GE	OG	O	OM
Process & Prevention Tech.	P	P	M	P	P
Services					
Solid Waste Management	G	OG	OM	EG	MP
Hazardous Waste Mgmt	G	O	O	OG	P
Consulting & Engineering	GE	OG	M	OG	MP
Remediation/Industrial Svcs.	G	O	M	OM	P
Analytical Services	G	O	O	O	MP
Water Treatment Works	MP	M	MP	GE	MP
Resources					
Water Utilities	MP	MP	P	GE	MP
Resource Recovery	O	OG	O	O	MP
Environmental Energy	OG	OG	OG	OG	P
Rating	111	105	93	111	47

Source: Environmental Business International, Inc., San Diego,, E-excellent, G-good, O-OK, M-mediocre, P-poor
Based on ratings of technology, commercial orientation, management, finance, global presence, govt support,etc

Both ThomasAssociates and Environmental Business International believe that U.S. will continue to struggle against the German and Japanese APC exporters primarily because of the quality issue. In addition, differences in marketing practices and expectations regarding acceptable timeframes for return on investment will continue to create competitive challenges for U.S. firms in the region.

However, a recent report by the **McIlvaine Company**, titled "MARKET POTENTIAL FOR U.S. COMPANIES IN ASIA" believes the U.S. is in a much stronger position.

"U.S. companies are highly successful at developing new products superior to those offered by competitors, and have greater experience in their application. These assets offer greater value to Asian customers, with advantages that are not offset by the geographical disadvantages of U.S. firms… Because R&D and design, rather than manufacturing costs, are the largest factor in competitiveness, a market leader in the U.S. can easily become a leader in Asia."

Nevertheless, the McIlvaine report also points out that major Japanese and European competitors have represented significant threats. The report attributes this primarily to the strict domestic regulations that that have driven APC industry development in those countries much the same way that tough regulations have driven industry growth and competency among U.S. firms. What remains unclear for the future, however, is whether the positive effect of strict regulation in the U.S. will be any greater than the positive effect of similarly strict regulations elsewhere.

The fact of the matter is that U.S. APC firms overall have not had the easiest time in Asia in the face of Japanese, German, U.K. and other emerging regional competitors. Firms that have lead in the U.S. domestic market have not always found themselves leading in Asia despite the theoretical blessing of having emerged from a large and strictly regulated domestic market. Other countries are increasingly providing similar breeding grounds for the emergence of viable international competitors. Indeed, many factors are at work in determining ultimate success. Wheelabrator's Air Division Director, R. Gupta, once stated that the lead times and politics required to make sales into the Asian power industry are an effective trade barrier for U.S. firms. Clearly, a strong market and an impressive business development experience at home are not always sufficient for success abroad.

3.5 Asia Regional APC Trade by Commodity

As noted earlier, within the APC segment, there are four main categories of commodity exports that are tracked in the OECD/ETI data. The 6-digit HS categories are:

HS	HS Description
840420	Condensers for steam or vapor power units
840510	Producer gas or water gas generators, acetylene gas generator & simple gas generators
842139	Filtering or purifying machinery and apparatus for gases, nes
842199	Parts for filtering or purifying machinery & apparatus for liquids or gases, nes

Many countries do not collect export data at greater than the 6-digit HS level, or track the ultimate application of such equipment, so although these categories undoubtedly include a great deal of environmental goods, other non-environmental commodities are, to some degree, included as well. On the other hand, there are also APC-related goods that fall outside these four main HS categories and are therefore not included in this analysis. Nevertheless, we believe that these figures are sufficiently robust and in general agreement with other independent data that they provide a reasonably accurate picture of trade values, particularly when the data are analyzed from a market share or time series perspective.

As shown below, the two categories of 842139 and 842199 account for the vast majority (94%) of APC commodity trade. And in both of those categories, Japan leads in export value to the region, closely followed by the U.S. and then, more distantly, by Germany. Both Japan and the U.S. have a 1999 market share of roughly 30% in these two key categories.

Figure 3.6 Major Country of Origin Export Value by APC Commodity in 1999

COUNTRY OF ORIGIN	840420 Condensers for steam or vapor power units	840510 Producer gas or water gas generators acetylene gas gen & sim gas gen	842139 Filtering or purifying machinery and apparatus for gases, nes	842199 Parts for filterg or purifyg mchy & apparatus for liquids or gases, nes	Total
Japan	1,192	3,131	84,750	103,731	192,803
U.S.	1,916	5,497	73,640	102,787	183,840
Germany	565	3,009	35,731	38,326	77,631
U.K.	10,605	2,910	16,828	17,831	48,175
Taiwan	67	27	6,354	13,161	19,609
Italy	1,305	185	6,796	8,453	16,738
China	1	51	7,103	8,102	15,257
Netherlands	-	1,436	5,756	4,470	11,663
France	634	976	3,932	5,364	10,906
Sweden	-	636	1,333	8,806	10,776
Korea	-	78	2,869	7,433	10,380
Canada	71	150	2,114	4,425	6,760
Denmark	-	1,594	3,136	1,576	6,307
Australia	128	310	1,969	3,431	5,838
Austria	-	-	1,179	661	1,840
Grand Total	16,484	19,989	253,492	328,558	618,523

All values in thousands (000's) of US dollars

Figure 3.7 Major Country of Origin Market Share by APC Commodity in 1999

COUNTRY OF ORIGIN	840420 Condensers for steam or vapor power units	840510 Producer gas or water gas generators acetylene gas gen & sim gas gen	842139 Filtering or purifying machinery and apparatus for gases nes	842199 Parts for filterg or purifyg mchy & apparatus for liquids or gases, nes	Total
Japan	7%	16%	33%	32%	31%
U.S.	12%	27%	29%	31%	30%
Germany	3%	15%	14%	12%	13%
U.K.	64%	15%	7%	5%	8%
Taiwan	0%	0%	3%	4%	3%
Italy	8%	1%	3%	3%	3%
China	0%	0%	3%	2%	2%
Netherlands	0%	7%	2%	1%	2%
France	4%	5%	2%	2%	2%
Sweden	0%	3%	1%	3%	2%
Korea	0%	0%	1%	2%	2%
Canada	0%	1%	1%	1%	1%
Denmark	0%	8%	1%	0%	1%
Australia	1%	2%	1%	1%	1%
Austria	0%	0%	0%	0%	0%
Grand Total	100%	100%	100%	100%	100%

3.6 United States Export Performance

This section looks briefly but specifically at U.S. APC export performance in the world, in Asia and among the US-AEP countries. Figure 3.6 shows that U.S. APC exports to Asia represented 20% of total U.S. APC exports in 1999. The number is 11% when looking at US-AEP countries alone. Exports to countries outside of Asia accounted for 80% of U.S. APC exports in the same year.

When we look at export trends over time (Figures 8-11), we see that Asia and the US-AEP countries have represented a declining share of total U.S. APC exports between 1995 and 1999. In 1998 and 1999, U.S. APC export growth to Asia and the US-AEP countries declined precipitously at –27% and –12% in both markets across the two years. This observation is certainly consistent with the challenge that the Asian economic crisis has presented to U.S. export industries overall and we would expect to see the trend reverse (as it may have already) as the regional economic recovery continues.

Figure 3.8 U.S. APC Export Value, 1995-1999

	1995	1996	1997	1998	1999
U.S. Total Exports	1,315,053	1,403,246	1,801,116	1,595,821	1,697,982
Non- Asian	864,881	909,928	1,273,906	1,212,281	1,360,218
To Asia	450,172	493,318	527,209	383,540	337,764
To US AEP Countries	**243,461**	**287,350**	**283,815**	**207,903**	**183,840**

All values in thousands (000's) of US dollars

Figure 3.9 U.S. APC Export Market Share, 1995-1999

	1995	1996	1997	1998	1999
U.S. Total Exports	100%	100%	100%	100%	100%
Non-Asian	66%	65%	71%	76%	80%
To Asia	34%	35%	29%	24%	20%
To US AEP Countries	**19%**	**20%**	**16%**	**13%**	**11%**

Figure 3.10 U.S. APC Export Growth, 1995-1999

	1995	1996	1997	1998	1999
U.S. Total Exports	-	7%	28%	-11%	6%
Non-Asian	-	5%	40%	-5%	12%
To Asia	-	10%	7%	-27%	-12%
To US AEP Countries	-	**18%**	**-1%**	**-27%**	**-12%**

Figure 3.11 U.S. APC Exports to Asia and the World

COUNTRY OF DESTINATION	1995	1996	1997	1998	1999	1995-1999 Grand Total
World	**1,315,053**	**1,403,246**	**1,801,116**	**1,595,821**	**1,697,982**	**7,813,218**
Japan	184,021	152,935	174,955	141,635	125,656	779,201
Taiwan	58,961	61,099	58,752	60,123	38,095	277,029
Korea	59,877	87,225	62,187	25,138	26,144	260,571
China	22,690	53,033	68,440	34,001	28,269	206,433
Singapore	29,049	49,451	46,686	29,886	41,186	196,259
Hong Kong	19,735	17,026	16,190	27,300	22,369	102,619
Thailand	26,371	18,463	20,726	12,210	10,897	88,667
India	9,660	15,663	19,967	16,837	16,774	78,900
Malaysia	14,627	12,471	19,463	10,918	12,595	70,075
Philippines	6,920	13,620	24,122	16,474	8,907	70,042
Indonesia	17,635	11,746	15,334	6,698	6,232	57,644
Vietnam	622	312	376	2,237	436	3,983
Sri Lanka	4	275	12	82	206	578

All values in thousands (000's) of US dollars

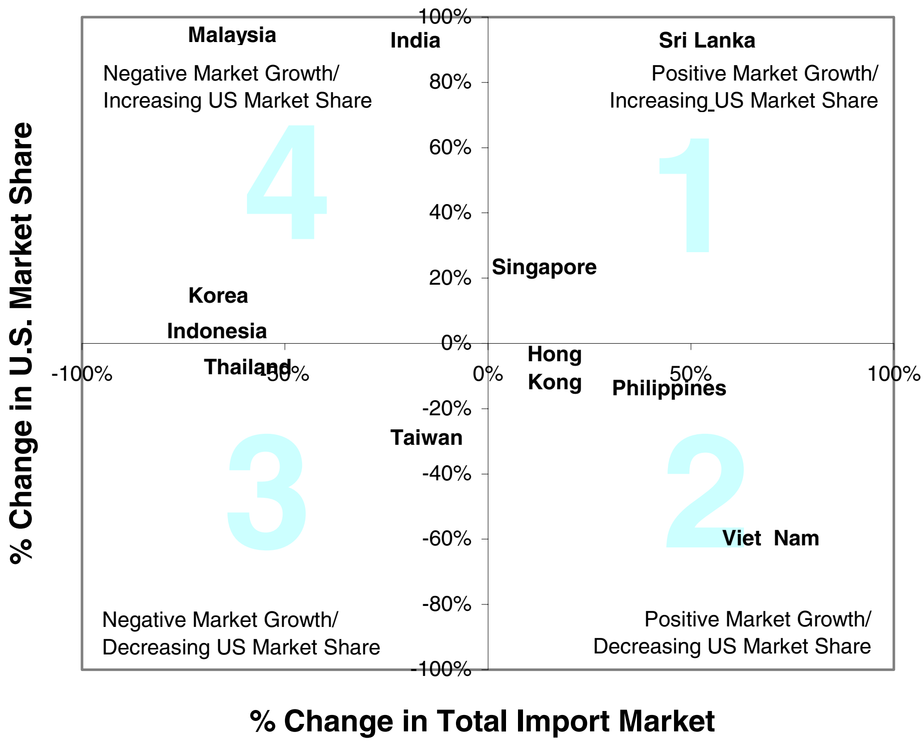
3.7 Priority Markets for U.S. Vendors and Priority Markets for US-AEP Assistance

APC export markets across US-AEP countries have both expanded and contracted. Such dynamic markets put pressure on the major market participants to adapt to changing conditions. Companies that don't adapt either miss opportunity in growing markets or over extend or over price in declining markets. Figures 3.12 and 3.13 below show two parameters for each US-AEP country: 1) APC exports growth to that country, and 2) U.S. market share of those exports. For each country, the growth of the overall exports is plotted against changes in U.S. market share. This shows how U.S. market share increased or decreased within the context of increasing or decreasing overall APC export markets for each US-AEP country. The horizontal axis shows the percent change in overall APC market growth for each country. The vertical axis shows the percent change in U.S. market share. All data cover the years 1995 through 1999.

Figure 3.12 APC Export Market Growth and U.S. Market Share Growth

	Percent Change in Total APC Import Market (1995 vs 1999)	Percent Change in U.S. Market Share (1995 vs 1999)
Hong Kong	20%	-6%
India	-11%	94%
Indonesia	-66%	4%
Korea	-62%	16%
Malaysia	-57%	101%
Philippines	46%	-12%
Singapore	16%	23%
Sri Lanka	51%	100%
Taiwan	-8%	-30%
Thailand	-56%	-7%
Vietnam	76%	-60%

Figure 3.13 APC Import Market Growth vs. U.S. Market Share



Countries in Quadrant 1 (upper right), including Sri Lanka and Singapore, show that overall exports of APC equipment to those countries increased while U.S. market share of those exports increased as well. The U.S. did relatively well in maintaining position in those countries. Countries in Quadrant 2 (lower right), including Hong Kong, Philippines and Viet Nam, have increasing export markets but the U.S. market share of those increasing exports has declined. This indicates that U.S. competitive position is slipping in those countries. Countries in Quadrant 3 (lower left), including Taiwan and Thailand, show an overall APC export market in decline accompanied by a loss of U.S. market share. Quadrant 4 (upper left), including Malaysia, India, Indonesia and Korea, shows countries where the overall APC export market is declining but the U.S. is nonetheless gaining ground.

3.8 US and Competitors Market Share Positions in US-AEP Markets

Relative market share based on the cumulative export value for years 1995 through 1999 by the US and its competitors in US-AEP countries are shown below in Figure 3.14. Trends within those countries for the US and its competitors in terms of export value to US-AEP countries in 1999 are shown in Figures 3.15 and 3.16. Together, these figures indicate significant resilience of the US APC industry. As Figure 3.14 shows, in nine of the 11 US-AEP countries, the US either leads (Hong Kong, India, Korea, and Singapore) or comes in second to Japan (Indonesia, Malaysia Philippines, Taiwan and Thailand). Only in Sri Lanka and Vietnam does the US register less than a double-digit share.

Figure 3.14 U.S. and Competitors APC Market Share, 1995-1999 (cumulative)

COUNTRY	Worldwide	Hong Kong	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thai-land	Taiwan	Vietnam	Total US-AEP Countries
US	26%	30%	21%	30%	37%	6%	21%	29%	41%	21%	33%	9%	30%
Germany	22%	6%	12%	23%	15%	11%	12%	7%	12%	17%	11%	22%	13%
UK	11%	16%	3%	13%	4%	10%	4%	5%	6%	4%	3%	13%	6%
Japan	10%	19%	26%	13%	32%	38%	36%	44%	23%	40%	41%	18%	32%
France	9%	2%	7%	9%	2%	9%	2%	3%	2%	3%	1%	6%	3%
Canada	5%	2%	1%	0%	1%	0%	1%	1%	1%	1%	2%	0%	1%
Italy	5%	1%	4%	5%	1%	11%	8%	1%	1%	2%	1%	5%	2%
Netherlands	3%	2%	1%	1%	1%	2%	3%	2%	2%	1%	1%	3%	1%
Austria	3%	0%	2%	1%	0%	1%	0%	1%	0%	0%	0%	1%	1%
Sweden	3%	1%	1%	1%	2%	1%	2%	0%	3%	1%	1%	0%	1%
Denmark	2%	1%	8%	1%	2%	8%	3%	2%	2%	4%	1%	4%	2%
Australia	1%	1%	4%	1%	1%	2%	2%	1%	2%	1%	2%	2%	2%
Taiwan	1%	10%	3%	0%	1%	0%	4%	3%	1%	3%	0%	10%	2%
China	1%	9%	1%	0%	0%	0%	0%	0%	1%	1%	1%	4%	1%
Korea	0%	1%	5%	2%	0%	2%	2%	1%	1%	1%	1%	2%	1%
Grand Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Value of Mkt	29,803	347	276	265	701	10	338	242	474	430	833	46	3,964

All values in millions (000,000's) of US dollars

Figures 3.15 and 3.16 (Advanced Developing Countries and Less Developed Countries, respectively) reveal trends within the US-AEP countries by the US and its top competitors in the region. Comparing US market share figures for 1995 and 1999, the US has maintained or increased market share in every US-AEP country except for the Philippines and Taiwan. Although Japan shows remarkable dominance in the Philippines, Taiwan, and Thailand, Taiwan with 50% of the market share, it has lost market share in five US-AEP countries: Hong Kong, Indonesia, Korea, Malaysia and Singapore.

Figure 3.15 APC Market Share Trends by year, 1995-1999 - ADCs (Advanced Developing Countries)

Country	US	JPN	GER	UK	CHN	TWN	ITA	FR	DEN	AUS
HK 95	31%	24%	6%	9%	13%	7%	2%	2%	1%	1%
HK 96	23%	23%	6%	20%	5%	11%	1%	3%	1%	1%
HK 97	25%	20%	6%	15%	7%	11%	2%	3%	1%	1%
HK 98	38%	14%	5%	10%	11%	11%	1%	1%	0%	1%
HK 99	29%	15%	5%	24%	10%	10%	1%	0%	1%	1%
KOR 95	32%	42%	11%	3%	0%	0%	1%	3%	3%	1%
KOR 96	38%	33%	19%	2%	0%	0%	1%	2%	1%	2%
KOR 97	40%	28%	14%	7%	0%	1%	2%	1%	2%	1%
KOR 98	41%	21%	17%	3%	0%	1%	2%	4%	4%	1%
KOR 99	37%	23%	17%	6%	3%	2%	2%	2%	1%	1%
MYS 95	15%	56%	7%	3%	0%	2%	5%	3%	4%	2%
MYS 96	18%	29%	17%	6%	0%	3%	14%	1%	2%	2%
MYS 97	26%	30%	16%	4%	1%	5%	5%	2%	2%	3%
MYS 98	21%	20%	11%	5%	0%	4%	13%	3%	8%	1%
MYS 99	29%	26%	14%	3%	0%	6%	1%	2%	0%	2%
SGP 95	38%	24%	10%	9%	1%	2%	3%	1%	1%	3%
SGP 96	51%	22%	13%	4%	0%	1%	1%	1%	1%	2%
SGP 97	39%	31%	9%	7%	0%	1%	1%	3%	1%	2%
SGP 98	32%	21%	17%	5%	0%	1%	1%	4%	7%	2%
SGP 99	47%	17%	10%	8%	1%	2%	2%	2%	1%	2%
TWN 95	35%	44%	7%	3%	0%	-	0%	2%	1%	3%
TWN 96	34%	50%	7%	2%	0%	-	0%	1%	0%	2%
TWN 97	37%	34%	16%	3%	0%	-	1%	1%	1%	1%
TWN 98	34%	33%	15%	4%	1%	-	1%	3%	0%	0%
TWN 99	25%	46%	13%	5%	2%	-	1%	1%	1%	0%

HK - US maintains mkt share lead; Japan sees 40% drop since 1995; UK dominates condenser segment and spikes in 1999 as a result of $10m in reported value in this sector – almost five times the amount spent in 1998.

Malaysia - Although the cumulative data in Figure 16 shows the US trailing Japan in Malaysia, Figure 17 shows the US actually was the market leader in 1998 and 1999.

Figure 3.16 APC Market Share Trends by year, 1995-1999 - LDCs (Less Developed Countries)

COUNTRY	US	JPN	GER	UK	CHN	TWN	ITA	FR	DEN	AUS
IND 95	17%	16%	26%	14%	0%	0%	1%	22%	1%	1%
IND 96	27%	9%	31%	9%	0%	0%	5%	8%	2%	2%
IND 97	40%	14%	22%	13%	0%	0%	2%	4%	0%	1%
IND 98	33%	14%	16%	16%	0%	0%	6%	6%	0%	1%
IND 99	33%	15%	16%	13%	1%	0%	13%	3%	1%	0%
IDN 95	27%	30%	8%	3%	1%	3%	4%	6%	6%	8%
IDN 96	15%	21%	13%	5%	1%	3%	5%	7%	13%	3%
IDN 97	19%	31%	11%	2%	3%	5%	5%	7%	4%	3%
IDN 98	24%	29%	12%	5%	0%	2%	1%	8%	9%	3%
IDN 99	28%	17%	18%	2%	0%	2%	6%	3%	3%	3%
PHL 95	21%	50%	3%	2%	0%	2%	0%	1%	5%	2%
PHL 96	28%	45%	2%	1%	0%	3%	1%	11%	1%	2%
PHL 97	37%	34%	2%	14%	1%	2%	0%	1%	6%	1%
PHL 98	34%	44%	10%	2%	0%	3%	1%	1%	0%	1%
PHL 99	19%	52%	17%	2%	0%	5%	1%	0%	0%	1%
LKA 95	0%	28%	13%	9%	0%	0%	0%	2%	41%	2%
LKA 96	17%	42%	17%	14%	1%	1%	2%	2%	1%	0%
LKA 97	1%	47%	5%	7%	0%	0%	1%	31%	0%	1%
LKA 98	5%	47%	14%	15%	0%	0%	2%	1%	0%	2%
LKA 99	7%	32%	8%	7%	0%	1%	33%	7%	0%	3%
THA 95	21%	35%	26%	2%	0%	2%	1%	4%	5%	1%
THA 96	19%	36%	18%	5%	0%	3%	5%	5%	4%	1%
THA 97	23%	43%	12%	4%	2%	4%	2%	3%	2%	1%
THA 98	20%	40%	16%	5%	1%	4%	0%	2%	7%	2%
THA 99	19%	52%	6%	3%	0%	5%	3%	2%	2%	0%
VNM 95	14%	30%	2%	1%	7%	25%	2%	0%	4%	9%
VNM 96	4%	15%	22%	15%	10%	12%	5%	7%	0%	0%
VNM 97	2%	14%	38%	22%	3%	8%	0%	0%	1%	3%
VNM 98	23%	12%	5%	12%	0%	6%	12%	13%	12%	1%
VNM 99	6%	31%	24%	3%	0%	9%	7%	12%	6%	1%

India: the US market share has almost doubled from 17% in 1995 to almost 34% in 1999. The Italians made a big move in 1999 capturing more than 13% of the share.

Indonesia: The US has also been moving up in Indonesia and grabbed the lead in 1999 with more than 28% of the market. Interestingly, Japan came in third with 16% of the market, behind Germany, which grabbed more than 18% of the market.

Philippines: US lost almost 45% of its market share from 1998 to 1999. Japan and Germany both gain at US expense.

3.9 APC Country Summaries

Total Import Market Size

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	347,627	276,452	265,449	701,239	10,292	338,152	242,256	473,615	430,125	833,397	45,608	3,964,214
1995	63,320	65,255	56,302	185,554	1,984	100,410	32,850	75,996	125,945	167,409	4,376	879,401
1999	76,059	22,215	50,328	69,800	2,991	43,086	48,027	87,932	55,902	154,497	7,687	618,523

Total Import Market Growth

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
$	12,739	(43,040)	(5,974)	(115,754)	1,007	(57,324)	15,177	11,936	(70,044)	(12,912)	3,311	(260,878)
%	20%	-66%	-11%	-62%	51%	-57%	46%	16%	-56%	-8%	76%	-30%

Rank by Size Among US-AEP Countries

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam
1995-1999	5	7	8	2	11	6	9	3	4	1	10
1995	7	6	8	1	11	4	9	5	3	2	10
1999	3	9	6	4	11	8	7	2	5	1	10

US Export Value

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	102,619	57,644	78,900	260,571	578	70,075	70,042	196,259	88,667	277,029	3,983	1,206,369
1995	19,735	17,635	9,660	59,877	377	14,627	6,920	29,049	26,371	58,961	622	243,461
1999	22,369	6,232	16,774	26,144	206	12,594	8,907	41,186	10,897	38,095	436	183,840

ExportGrowth1995–1999

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
$	2,634	(11,403)	7,114	(33,733)	202	(2,032)	1,987	12,137	(15,474)	(20,866)	(186)	(59,621)
%	13%	-65%	74%	-56%	5362%	-14%	29%	42%	-59%	-35%	-30%	-24%

US Market Share

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	30%	21%	30%	37%	6%	21%	29%	41%	21%	33%	9%	30%
1995	31%	27%	17%	32%	0%	15%	21%	38%	21%	35%	14%	28%
1999	29%	28%	33%	37%	7%	29%	19%	47%	19%	25%	6%	30%

US Marke tShare Rank

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	1	2	1	1	7	2	2	1	2	2	5	2
1995	1	2	3	2	11	2	2	1	3	2	3	2
1999	1	1	1	1	4	1	2	1	2	2	7	2

Market Share Leader

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	US	Japan	US	US	Japan	Japan	Japan	US	Japan	Japan	Ger	Japan
1995	US	Japan	Ger	Japan	Den	Japan	Japan	US	Japan	Japan	Japan	Japan
1999	US	US	US	US	Italy	US	Japan	US	Japan	Japan	Japan	Japan

US-AEP

United States–Asia
Environmental Partnership

U.S. Environmental Industry Export Competitiveness

Chapter 4. Heat & Energy Management and Renewable Energy Plants

October, 2001

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4.1 Executive Summary

The objective of this report is to evaluate U.S. environmental industry competitiveness specifically in the combined market sectors of heat/energy management (H/M) and renewable energy plants (REP). This combined sector is hereafter referred to as HM/REP. The results of this analysis will highlight areas of relative strength and weakness of U.S. HM/REP exports globally and within the US-AEP countries. These results are to help guide the efforts and attentions of both U.S. private industry and US-AEP.

U.S. companies accounted for approximately 25% of the total value of environmental exports worldwide in 1999. In the same year, German and Japanese competitors captured market shares of 19% and 15% respectively. In the combined sectors of heat/energy management and renewable energy plants (HE/REP), the U.S. surrenders its leadership position to the Japanese who enjoyed a cumulative global market share of 21% between 1995 and 1999. The U.S. and Germany trailed with 19% and 13% respectively.

In Asia specifically, U.S. HE/REP suppliers fall even further behind the Japanese who dominated regional HE/REP exports with a 43% cumulative share during the period. The U.S. and Germany trailed far behind with 20% and 8% shares respectively. However, in looking at year-to-year performance, the U.S. saw significant competitive improvements while the Japanese position held roughly steady.

Within the individual US-AEP countries, U.S. HE/REP export performance has been extremely mixed. In Hong Kong, the Philippines and to a lesser degree Malaysia, rapidly growing markets have been accompanied by dramatic improvements in U.S. competitiveness. At the other extreme, Sri Lanka, where overall import markets also increased, saw U.S. exports drop to zero. In Thailand, Indonesia and Korea, markets have contracted and so has U.S. performance.

4.2 The U.S. Trails Japan Slightly in Global HE/REP Trade

Figure 4.1 shows global HE/REP exports ranked by country of origin according to cumulative exports from 1995 to 1999. Over the five-year period, the total HE/REP export market was approximately $36 billion. From 1995 to 1999, Japan was the leading worldwide exporter of HE/REP equipment with a cumulative total of approximately $7.7 billion of exports. Over the same period, the U.S. followed closely with a cumulative total of approximately $7 billion, followed by Germany at $4.8 billion. In 1999 alone, global exports of HE/REP equipment totaled $8.1 billion. In the same year, Japan and the U.S. saw global HE/REP exports of $1.9 billion and $1.6 billion, respectively.

Figure 4.1 Global HE/REP Export Value by Major Country of Origin, 1995-1999

COUNTRY OF ORIGIN	1995	1996	1997	1998	1999	Total 1995-1999
Japan	1,488,165	1,301,257	1,487,478	1,582,885	1,854,892	7,714,676
US	1,052,393	1,143,851	1,454,851	1,771,137	1,600,366	7,022,598
Germany	826,531	967,353	985,538	992,821	1,010,188	4,782,431
Denmark	493,094	501,091	472,793	538,565	737,814	2,743,358
France	515,759	522,760	508,849	594,744	459,313	2,601,424
Italy	434,939	508,475	475,503	535,278	458,064	2,412,259
UK	357,442	338,207	360,782	350,554	366,594	1,773,578
Sweden	246,717	183,361	140,429	390,068	404,761	1,365,336
Netherlands	578,668	158,634	150,559	130,948	184,802	1,203,611
Taiwan	202,841	185,085	197,026	251,173	294,554	1,130,678
Korea	160,774	160,268	185,027	230,954	228,014	965,037
Austria	180,546	150,658	117,215	197,868	187,741	834,029
China	123,673	112,574	141,665	162,280	176,063	716,254
Canada	101,144	123,463	121,741	151,850	145,023	643,221
Australia	41,071	48,575	50,803	25,831	20,852	187,133
Grand Total	6,803,757	6,405,611	6,850,258	7,906,955	8,129,042	36,095,623

All values in thousands (000's) of US dollars

Figure 4.2 shows global HE/REP export market shares from 1995 to 1999. During the period, Japan's cumulative exports represented 21% of the total market, followed by the U.S. at 19% and Germany at 13%. The market shares of the Japanese and the Germans held fairly steady during the period while the U.S. enjoyed an increase from 15% in 1995 to 20% in 1999. Overall, the U.S. showed the greatest gain in export performance among the market leaders, significantly narrowing the gap with the Japanese.

Figure 4.2 Global Export Market Share by Major Country of Origin, 1995-1999

COUNTRY OF ORIGIN	1995	1996	1997	1998	1999	Total 1995-1999
Japan	22%	20%	22%	20%	23%	21%
US	15%	18%	21%	22%	20%	19%
Germany	12%	15%	14%	13%	12%	13%
Denmark	7%	8%	7%	7%	9%	8%
France	8%	8%	7%	8%	6%	7%
Italy	6%	8%	7%	7%	6%	7%
UK	5%	5%	5%	4%	5%	5%
Sweden	4%	3%	2%	5%	5%	4%
Netherlands	9%	2%	2%	2%	2%	3%
Taiwan	3%	3%	3%	3%	4%	3%
Korea	2%	3%	3%	3%	3%	3%
Austria	3%	2%	2%	3%	2%	2%
China	2%	2%	2%	2%	2%	2%
Canada	1%	2%	2%	2%	2%	2%
Australia	1%	1%	1%	0%	0%	1%
Grand Total	100%	100%	100%	100%	100%	100%

4.3 The U.S. Trails Sharply Behind Japan in HE/REP Exports to US-AEP Countries

Figure 4.3 shows HE/REP exports to US-AEP countries ranked by country of origin according to cumulative exports from 1995 to 1999. Over the five-year period, the total US-AEP HE/REP export market was approximately $10.1 billion, representing more than 25% of the worldwide market. Japan was the dominant exporter (in terms of total dollar value) with over $4.3 billion of total HE/REP export value. The U.S. followed distantly in second place with approximately $2 billion in exports. In third place over the 1995-99 period was Germany at approximately $790 million. It is important to note, however, that Taiwan HE/REP exports actually surpassed those of Germany for the first time in 1999. Other Asian exporters saw similar gains during the period. Overall, the U.S., which was closely competitive with the Japanese in global markets, performs far less effectively within the US-AEP markets.

Figure 4.3 HE/REP Export Value by Major Country of Origin Across All US-AEP Countries, 1995-1999

COUNTRY OF ORIGIN	1995	1996	1997	1998	1999	Total 1995-1999
Japan	838,266	782,656	836,608	835,344	1,038,188	4,331,062
US	231,461	297,853	488,809	547,472	468,362	2,033,957
Germany	161,141	156,050	170,115	166,453	136,648	790,407
Taiwan	124,999	112,294	122,945	156,161	174,778	691,177
China	88,167	76,123	88,139	95,666	111,950	460,045
Italy	75,242	95,624	78,535	110,299	52,288	411,987
Korea	51,182	60,581	90,501	111,864	80,366	394,493
France	64,447	75,744	82,661	99,100	39,835	361,787
Denmark	151,879	24,935	6,586	7,619	3,764	194,783
UK	46,172	50,762	30,183	36,593	21,018	184,728
Sweden	9,481	18,132	34,165	45,551	22,044	129,373
Australia	18,337	21,396	19,087	8,754	4,875	72,449
Austria	6,736	625	814	7,225	7,608	23,009
Netherlands	4,662	4,127	3,992	3,006	6,078	21,866
Canada	2,648	6,759	4,565	4,053	2,217	20,243
Grand Total	1,874,822	1,783,661	2,057,706	2,235,161	2,170,018	10,121,368

All values in thousands (000's) of US dollars

Figure 4.4 shows the total values converted to HE/REP export market shares among US-AEP countries, again ranked by cumulative 1995-99 market share. Over the five-year period, Japan led with a cumulative 43% share, followed by the U.S. at 20% and Germany and Taiwan at 8% and 7% respectively. Although the U.S. position has been weak relative to the Japanese, the U.S. share did rise significantly from 12% to 22% between 1995 and 1999. These U.S. gains are similar to those observed in global markets. During the same period, Germany saw the greatest decline in competitiveness.

Figure 4.4 HE/REP Export Market Share by Major Country of Origin Across All US-AEP Countries, 1995-1999

COUNTRY OF ORIGIN	1995	1996	1997	1998	1999	Total 1995-1999
Japan	45%	44%	41%	37%	48%	43%
US	12%	17%	24%	24%	22%	20%
Germany	9%	9%	8%	7%	6%	8%
Taiwan	7%	6%	6%	7%	8%	7%
China	5%	4%	4%	4%	5%	5%
Italy	4%	5%	4%	5%	2%	4%
Korea	3%	3%	4%	5%	4%	4%
France	3%	4%	4%	4%	2%	4%
Denmark	8%	1%	0%	0%	0%	2%
UK	2%	3%	1%	2%	1%	2%
Sweden	1%	1%	2%	2%	1%	1%
Australia	1%	1%	1%	0%	0%	1%
Austria	0%	0%	0%	0%	0%	0%
Netherlands	0%	0%	0%	0%	0%	0%
Canada	0%	0%	0%	0%	0%	0%
Grand Total	100%	100%	100%	100%	100%	100%

4.4 Various Opinions on U.S. Competitiveness in Asia

The OECD export data shows that the U.S. is a dominant player in global environmental markets. However, within the global HE/REP, the U.S. trails slightly behind Japan. In Asia more specifically, U.S. exporters fall significantly further behind the Japanese who dominate among the US-AEP countries with a 43% market share.

Environmental Business International shed some light on how U.S. firms stack up against other competitors in HE/REP export markets. EBI rated each country's ability to compete in each of the major environmental market segments as defined by EBI. The OECD/ETI sectors of Heat & Energy (HE) and Renewable Energy Plants (REP) do not correspond strictly to established EBI segments. However, the closest proxy we have is the EBI segment of Environmental Energy Sources, which includes power and systems in solar, wind, geothermal, small scale hydro, energy efficiency and demand side management.

As shown, the U.S. and its competitors (with the exception of the "poorly" performing developing countries) are all rated "OG" which is between OK and Good. This is borne out to some degree by the OECD/ETI data that shows all of the competitors with active exports that are roughly on par with their economic position globally. The exception perhaps is Japan, which, according to the OECD/ETI data, enjoys a stronger global position than the size and recent performance of the Japanese economy might imply. Naturally, if we are to see any advantage for the Japanese, one would expect it to manifest among the US-AEP countries just as the OECD/ETI data suggest.

Figure 4.5 Relative Competitiveness of Environmental Exporters

Equipment	**US**	**Germ**	**Japan**	**F&UK**	**Dev'g**
Water Equipment & Chemicals	G	G	GE	GE	MP
Air Pollution Control	OG	E	E	O	MP
Instruments & Info. Systems	E	G	G	O	P
Waste Mgmt Equipment	G	GE	OG	O	OM
Process & Prevention Tech.	P	P	M	P	P
Services					
Solid Waste Management	G	OG	OM	EG	MP
Hazardous Waste Mgmt	G	O	O	OG	P
Consulting & Engineering	GE	OG	M	OG	MP
Remediation/Industrial Svcs.	G	O	M	OM	P
Analytical Services	G	O	O	O	MP
Water Treatment Works	MP	M	MP	GE	MP
Resources					
Water Utilities	MP	MP	P	GE	MP
Resource Recovery	O	OG	O	O	MP
Environmental Energy Systems	OG	OG	OG	OG	P
Rating	111	105	93	111	47

Source: Environmental Business International, Inc., San Diego,, E-excellent, G-good, O-OK, M-mediocre, P-poor
Based on ratings of technology, commercial orientation, management, finance, global presence, govt support,etc

Both ThomasAssociates and Environmental Business International believe that U.S. will remain competitive internationally but will continue to struggle against the Japanese in Asia. But, as shown already by the OECD/ETI data, the U.S. may continue to close the gap. Recent scrutiny of energy issues in the U.S. will bring greater attention to alternative and renewable energy technologies and practices. Although there is criticism of U.S. administration efforts on alternative energy, some U.S. technology innovators will look beyond the immediate debate to focus on the long-term and immutable problem of energy supply and they will continue to invest in R&D that will ultimately help to improve U.S. international competitiveness. The Japanese and Europeans addressed, to one degree or another, many of these energy efficiency challenges early on and have already reaped the earliest and least costly benefits of their attention to energy R&D.

4.5 Asia Regional HE/REP Trade by Commodity

Within the combined HE/REP segment, there are eight categories of commodity exports that are tracked in the OECD/ETI data. The 6-digit HS categories are:

HS	HS Description
854140	Photosensitive semiconductor device, photovoltaic cells & light emit diodes
841950	Heat exchange units, non-domestic, non-electric
850230	Electric generating sets, nes
841090	Parts of hydraulic turbines & water wheels including regulators
841013	Hydraulic turbines and water wheels of a power exceeding 10000 KW
841919	Instantaneous or storage water heaters, non-electric, nes
841012	Hyd turbines & water wheels of a power exc 1000 KW but nt excedg 10000KW
841011	Hydraulic turbines & water wheels of a power not exceeding 1000 KW

In five of the eight commodity categories Japan leads with the largest market share. The U.S. is dominant in two categories (water heaters and small hydro-turbines) while Germany leads in mid-size hydro-turbines.

As shown below, the category 854140 accounts for the vast majority (77%) of HE/REP commodity trade. In that category, Japan dominates with a 51% share, followed by the U.S. at 24%. But it is here that some limitation of the OECD/ETI data are revealed. This HS code is part of the family of semiconductor codes but was selected because it includes photovoltaic products (solar cells and panels). However, according to US export data, solar cells and panels only make up approximately 15% of the export value for this HS code in April and May 2000. Backing this category out, will not change the overall market rankings of the US and Japan, however, Taiwan, and China drop quite few notches while Italy would gain the most and move into the third spot. For the overall analysis, the inclusion of this category can certainly reveal much about relative competitiveness.

In the next largest category (841950), which includes heat exchange units, the Japanese lead is similarly large with a market share of 28% followed by Germany at 13%, and the U.S., Korea and Italy each with a 10% market share.

Figure 4.6 Export Value by Major HE/REP Commodity and Major Country of Origin in 1999

COUNTRY OF ORIGIN	854140 Photosensitive semiconductors photovoltaic cells & light emit diodes	841950 Heat exchange units, non-domestic, non-electric	850230 Electric generating sets, nes	841090 Parts of hydraulic turbines & water wheels including regulators	841013 Hydraulic turbines and water wheels of a power exceeding 10000 KW	841919 Instantaneous or storage water heaters, non-electric, nes	841012 Hyd turbines & water wheels of a power exc 1000 KW but nt excedg 10000KW	841011 Hydraulic turbines & water wheels of a power not exceeding 1000 KW	Grand Total
Japan	854,263	77,285	39,295	31,487	35,606	94	154	2	1,038,188
US	398,758	28,718	28,978	2,216	756	8,321	26	589	468,362
Taiwan	162,195	8,496	1,583	287	-	2,165	-	53	174,778
Germany	93,109	36,333	412	2,825	-	2,255	1,714	-	136,648
China	107,151	1,506	903	1,759	-	61	497	72	111,950
Korea	51,799	27,330	778	371	-	88	-	-	80,366
Italy	1,003	28,606	13,976	8,624	-	79	-	-	52,288
France	1,408	24,489	2,019	8,094	3,275	11	524	14	39,835
Sweden	494	19,619	1,565	248	-	79	-	39	22,044
UK	4,338	9,023	3,656	1,815	1,557	623	-	5	21,018
Austria	299	1,641	263	4,149	-	136	1,120	-	7,608
Netherlands	-	6,043	2	7	-	26	-	-	6,078
Australia	2,242	1,946	239	439	-	-	2	7	4,875
Denmark	397	1,574	1,768	3	-	22	-	-	3,764
Canada	479	1,463	-	244	-	31	-	-	2,217
Total	1,677,936	274,073	95,437	62,568	41,194	13,991	4,037	781	2,170,018

All values in thousands (000's) of US dollars

Figure 4.7 Market Share by Major HE/REP Commodity and Major Country of Origin in 1999

COUNTRY OF ORIGIN	854140 Photosensitive semiconduct device, photovoltaic cells & light emit diodes	841950 Heat exchange units, non-domestic, non-electric	850230 Electric generating sets, nes	841090 Parts of hydraulic turbines & water wheels including regulators	841013 Hydraulic turbines and water wheels of a power exceeding 10000 KW	841919 Instantaneous or storage water heaters, non-electric, nes	841012 Hyd turbines & water wheels of a power exc 1000 KW but nt excedg 10000KW	841011 Hydraulic turbines & water wheels of a power not exceeding 1000 KW	Grand Total
Japan	51%	28%	41%	50%	86%	1%	4%	0%	48%
US	24%	10%	30%	4%	2%	59%	1%	75%	22%
Taiwan	10%	3%	2%	0%	0%	15%	0%	7%	8%
Germany	6%	13%	0%	5%	0%	16%	42%	0%	6%
China	6%	1%	1%	3%	0%	0%	12%	9%	5%
Korea	3%	10%	1%	1%	0%	1%	0%	0%	4%
Italy	0%	10%	15%	14%	0%	1%	0%	0%	2%
France	0%	9%	2%	13%	8%	0%	13%	2%	2%
Sweden	0%	7%	2%	0%	0%	1%	0%	5%	1%
UK	0%	3%	4%	3%	4%	4%	0%	1%	1%
Austria	0%	1%	0%	7%	0%	1%	28%	0%	0%
Netherlands	0%	2%	0%	0%	0%	0%	0%	0%	0%
Australia	0%	1%	0%	1%	0%	0%	0%	1%	0%
Denmark	0%	1%	2%	0%	0%	0%	0%	0%	0%
Canada	0%	1%	0%	0%	0%	0%	0%	0%	0%
Percent of Total	77%	13%	4%	3%	2%	1%	0%	0%	100%

4.6 United States Export Performance

This section looks at U.S. HE/REP export performance in the world, in Asia and among the US-AEP countries. U.S. HE/REP exports to Asia represented 41% of total U.S. HE/REP exports in 1999. The number is 29% when looking at US-AEP countries alone. Exports to countries outside of Asia accounted for 59% of U.S. HE/REP exports in the same year.

When we look at export trends over time, we see that Asia and the US-AEP countries have represented an unsteady but generally increasing share of total U.S. HE/REP exports between 1995 and 1999. Between 1998 and 1999, however, U.S. HE/REP export growth to Asia and the US-AEP countries declined significantly along with an overall decline in HE/REP exports by 10%. This observation is certainly consistent with the challenge that the Asian economic crisis has presented to U.S. export industries overall and we would expect to see the trend reverse (as it may have already) as the regional economic recovery continues.

Figure 4.8 U.S. HE/REP Export Value, 1995-1999

	1995	1996	1997	1998	1999
US Total Exports	1,052,393	1,143,851	1,454,851	1,771,137	1,600,366
Non- Asian	653,716	716,786	778,672	1,070,956	951,186
To Asia	398,677	427,065	676,179	700,181	649,180
To US AEP Countries	**231,461**	**297,853**	**488,809**	**547,472**	**468,362**

All values in thousands (000's) of US dollars

Figure 4.9 U.S. HE/REP Export Market Share, 1995-1999

	1995	1996	1997	1998	1999
US Total Exports	100%	100%	100%	100%	100%
Non-Asian	62%	63%	54%	60%	59%
To Asia	38%	37%	46%	40%	41%
To US AEP Countries	**22%**	**26%**	**34%**	**31%**	**29%**

Figure 4.10 U.S. HE/REP Export Growth, 1995-1999

	1995	1996	1997	1998	1999
US Total Exports	-	9%	27%	22%	-10%
Non-Asian	-	10%	9%	38%	-11%
To Asia	-	7%	58%	4%	-7%
To US AEP Countries	**-**	**29%**	**64%**	**12%**	**-14%**

Figure 4.11 U.S. HE/REP Exports to Asia and the World, 1995-1999

DESTINATION	1995	1996	1997	1998	1999	Total 1995-1999
World	1,052,393	1,143,851	1,454,851	1,771,137	1,600,366	7,022,598
Philippines	16,260	51,965	188,648	310,261	212,936	780,069
Japan	109,166	104,533	135,845	113,264	122,658	585,467
Malaysia	29,841	45,137	59,624	68,429	71,611	274,642
Singapore	38,513	48,767	59,932	43,421	50,222	240,854
China	58,050	24,679	51,525	39,444	58,161	231,858
Korea	50,226	67,984	49,519	20,350	12,979	201,058
Indonesia	27,249	28,401	53,928	35,568	8,928	154,074
Taiwan	38,275	18,865	26,960	23,428	38,934	146,463
HK	9,463	7,454	10,384	22,240	51,049	100,590
India	10,078	21,987	25,957	14,751	14,937	87,710
Thailand	10,822	7,251	13,715	7,759	6,345	45,894
Vietnam	632	9	124	1,159	419	2,343
Sri Lanka	103	32	17	107	-	260

All values in thousands (000's) of US dollars

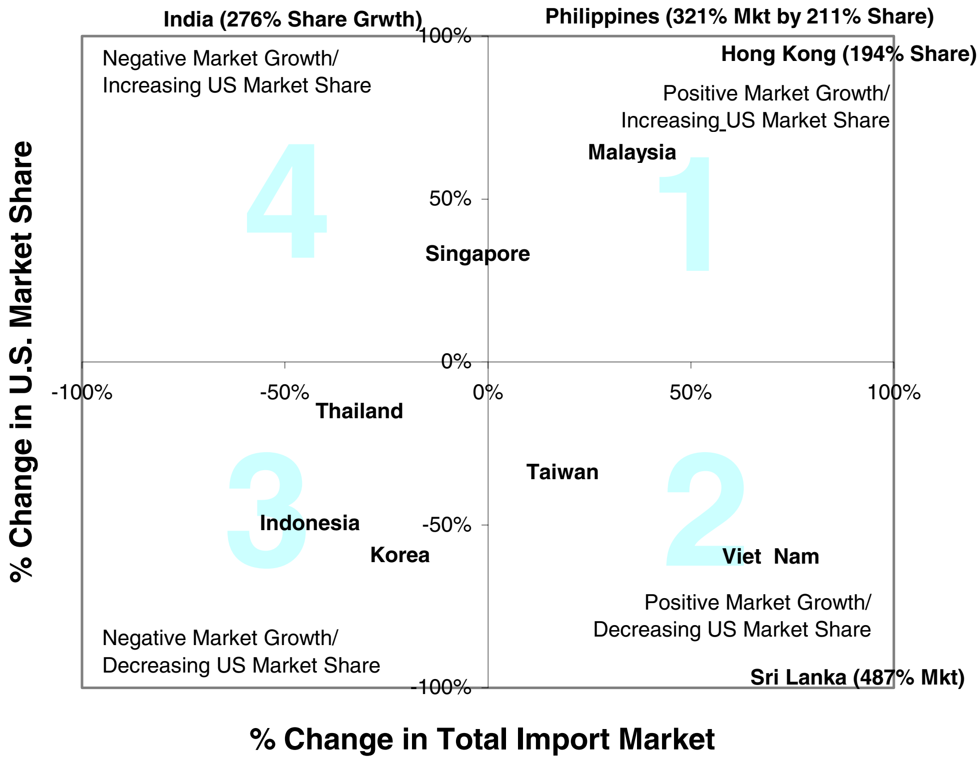
4.7 Priority Markets for U.S. Vendors and for US-AEP Assistance

HE/REP export markets across US-AEP countries have both expanded and contracted depending on the country. Such dynamic markets put pressure on the major market participants to adapt to changing conditions. Companies that don't adapt either miss opportunity in growing markets or over extend or over price in declining markets. Figures 4.12 and 4.13 below show two parameters for each US-AEP country: 1) HE/REP exports growth to that country, and 2) U.S. market share of those exports. For each country, the growth of the overall exports is plotted against changes in U.S. market share. This shows how U.S. market share increased or decreased within the context of increasing or decreasing overall HE/REP export markets for each US-AEP country. In Figure 4.13, the horizontal axis shows the percent change in overall HE/REP market growth for each country. The vertical axis shows the percent change in U.S. market share. All data cover the years 1995 through 1999.

Figure 4.12 HE/REP Export Market Growth and U.S. Market Share Growth

	Percent Change in Total HE/REP Import Market (1995 vs 1999)	Percent Change in U.S. Market Share (1995 vs 1999)
Hong Kong	83%	194%
India	-61%	276%
Indonesia	-31%	-52%
Korea	-28%	-64%
Malaysia	44%	66%
Philippines	321%	211%
Singapore	0%	30%
Sri Lanka	487%	-100%
Taiwan	42%	-28%
Thailand	-36%	-8%
Vietnam	88%	-65%

Figure 4.13 HE/REP Import Market Growth vs. U.S. Market Share



Countries in Quadrant 1 (upper right), including Philippines, Hong Kong and Malysia, show that overall exports of HE/REP equipment to those countries increased while U.S. market share of those exports increased as well. The U.S. did relatively well in maintaining position in those countries. The U.S. also increased market share in Singapore where overall market growth was zero. Countries in Quadrant 2 (lower right), including Taiwan, Vietnam and Sri Lanka, have growing import markets but the U.S. market share of those markets has declined. This indicates that U.S. competitive position is slipping in those countries. Countries in Quadrant 3 (lower left), including Indonesia, Korea and Thailand, show an overall HE/REP import market in decline accompanied by a loss of U.S. market share. Quadrant 4 (upper left), including only India, shows countries where the overall HE/REP import market is declining but the U.S. is nonetheless gaining ground.

HE/REP markets and U.S. competitiveness in those markets show extreme variation. In the Philippines, not only did the import market for HE/REP grow by 321% between 1995 and 1999, but the U.S. share of that expanded market more than doubled. In Hong Kong, a market that grew substantially by 83% during the period also saw a tremendous increase in U.S. market share of 194%. In India, where the overall import market fell by 61%, the U.S. nevertheless strengthened its position with a 276% increase in market share. In Sri Lanka, a hugely expanded import market (487%) seemed to escape U.S. vendors who realized no sales in 1999, representing a 100% decline.

4.8 US and Competitors Market Share Positions in US-AEP Markets

Relative market share based on the cumulative export value for years 1995 through 1999 by the US and its competitors in US-AEP countries are shown below in Figure 4.14. Trends within those countries for the US and its competitors in terms of export value to US-AEP countries in 1999 are shown in Figures 4.15 and 4.16. As Figure 4.14 shows, Japan clearly dominates in eight of the 11 US-AEP countries. The Asian competitors (Japan, China, Taiwan, and Korea) own the Hong Kong market capturing 91% of the market share. The US leads in just two: Indonesia and the Philippines, and comes in a distance second in just four other countries: Korea, Malaysia, Singapore, and Taiwan. Germany appears to have the lock on Sri Lanka and Denmark challenges the Japanese in India.

Figure 4.14 U.S. and Competitors HE/REP Market Share, 1995-1999 (cumulative)

Country	Worldwide	Hong Kong	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thai-land	Taiwan	Vietnam	Total US-AEP Countries
Japan	21%	44%	30%	23%	65%	2%	35%	12%	53%	51%	58%	30%	43%
US	19%	6%	31%	10%	13%	2%	24%	64%	19%	7%	14%	5%	20%
Germany	13%	1%	5%	8%	5%	34%	19%	18%	3%	7%	6%	18%	8%
Denmark	8%	0%	0%	19%	1%	8%	0%	0%	0%	0%	0%	0%	2%
France	7%	0%	8%	12%	5%	16%	2%	1%	1%	3%	5%	6%	4%
Italy	7%	0%	6%	16%	2%	9%	4%	1%	4%	8%	4%	0%	4%
UK	5%	1%	2%	2%	2%	17%	1%	1%	4%	2%	1%	10%	2%
Sweden	4%	0%	5%	2%	2%	0%	2%	0%	1%	1%	1%	9%	1%
Netherlands	3%	0%	1%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%
Taiwan	3%	24%	1%	1%	3%	3%	6%	1%	5%	5%	0%	3%	7%
Korea	3%	6%	4%	3%	0%	0%	2%	1%	7%	12%	4%	4%	4%
Austria	2%	0%	2%	0%	0%	0%	0%	0%	0%	1%	0%	2%	0%
China	2%	17%	2%	2%	1%	6%	2%	1%	1%	0%	5%	6%	5%
Canada	2%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
Australia	1%	0%	3%	0%	1%	4%	1%	0%	1%	1%	0%	6%	1%
Grand Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Value of Mkt	36,096	1,828	496	837	1,536	15	1,138	1,220	1,268	673	1,061	50	10,121

All values in millions (000,000's) of US dollars

Figure 4.15 and 16 (Advanced Developing Countries and Less Developed Countries, respectively) reveal trends within the US-AEP countries by the US and its top competitors in the region. Comparing US market share figures for 1995 and 1999, the US has maintained or increased market share in Hong Kong, Malaysia, Singapore, India, and the Philippines. During this same period, the US lost considerable market share in Korea, Taiwan and Indonesia. Since 1995, Japan has either maintained or increased their market share in all the US-AEP countries. By 1999, Japan had a 45% or greater market share in eight of the US-AEP countries.

Figure 4.15 HE/REP Market Share Trends, 1995-1999 - ADCs (Advanced Developing Countries)

Country	JPN	US	GER	TWN	CHN	ITA	KOR	FRA	DNK	UK
HK 95	42%	3%	1%	25%	18%	1%	5%	1%	1%	3%
HK 96	45%	3%	1%	23%	19%	1%	5%	0%	1%	2%
HK 97	46%	3%	1%	22%	18%	0%	8%	0%	0%	2%
HK 98	39%	6%	1%	29%	16%	0%	6%	0%	0%	1%
HK 99	46%	10%	0%	23%	16%	0%	5%	0%	0%	0%
KOR 95	68%	14%	3%	3%	2%	2%	0%	4%	1%	2%
KOR 96	56%	18%	5%	3%	0%	6%	0%	7%	1%	2%
KOR 97	60%	15%	9%	2%	0%	1%	0%	4%	1%	2%
KOR 98	67%	10%	6%	3%	0%	0%	0%	9%	1%	3%
KOR 99	79%	5%	2%	4%	0%	1%	0%	4%	0%	1%
MYS 95	36%	17%	27%	5%	0%	4%	0%	1%	1%	6%
MYS 96	37%	21%	21%	8%	2%	5%	0%	4%	0%	1%
MYS 97	35%	27%	19%	5%	1%	8%	1%	2%	0%	0%
MYS 98	32%	26%	16%	7%	2%	1%	5%	3%	0%	1%
MYS 99	34%	27%	17%	7%	3%	5%	3%	2%	0%	1%
SGP 95	54%	15%	2%	9%	2%	6%	5%	2%	1%	2%
SGP 96	53%	19%	3%	4%	1%	4%	4%	1%	0%	5%
SGP 97	53%	23%	4%	7%	0%	1%	7%	2%	0%	3%
SGP 98	54%	18%	3%	4%	0%	1%	8%	2%	0%	7%
SGP 99	53%	19%	2%	4%	1%	6%	10%	1%	0%	2%
TWN 95	56%	24%	4%	-	9%	1%	2%	1%	0%	2%
TWN 96	53%	14%	4%	-	9%	4%	2%	6%	0%	5%
TWN 97	66%	13%	4%	-	6%	3%	2%	4%	0%	1%
TWN 98	55%	7%	11%	-	3%	7%	6%	9%	0%	1%
TWN 99	60%	17%	4%	-	4%	4%	5%	2%	0%	1%

Hong Kong:- Over the last 5 years, 93% of the market value stems from HS code 854140 – photosensitive semiconductors. HK market share in the other HE/REP categories is dominated by the US and Taiwan –each with 40%

Korea: Overall market value has decreased by 11% since 1995. US export value has decreased by 74%.

Malaysia:– US export value has increased by 140% since 1995 ($30m to $72m) thus overtaking the Germans for second place.

Figure 4.16 HE/REP Market Share Trends, 1995-1999 – LDCs (Less Developed Countries)

Country	JPN	US	GER	TWN	CHN	ITA	KOR	FRA	DNK	UK
IND 95	26%	4%	8%	0%	0%	2%	0%	8%	49%	1%
IND 96	23%	16%	12%	1%	0%	13%	0%	13%	13%	3%
IND 97	3%	22%	9%	1%	0%	29%	0%	26%	1%	4%
IND 98	12%	8%	6%	1%	9%	39%	12%	8%	1%	1%
IND 99	55%	13%	9%	2%	0%	2%	4%	8%	1%	3%
IDN 95	28%	36%	6%	1%	1%	4%	4%	7%	2%	2%
IDN 96	26%	26%	4%	1%	1%	16%	3%	10%	0%	6%
IDN 97	24%	35%	7%	0%	3%	6%	5%	7%	0%	0%
IDN 98	26%	34%	5%	1%	0%	1%	6%	11%	0%	0%
IDN 99	68%	17%	1%	1%	1%	1%	1%	3%	0%	3%
PHL 95	15%	20%	53%	2%	6%	0%	1%	0%	0%	3%
PHL 96	15%	42%	37%	1%	1%	0%	1%	0%	0%	2%
PHL 97	10%	68%	14%	1%	0%	0%	1%	3%	0%	1%
PHL 98	8%	78%	11%	1%	1%	0%	1%	1%	0%	0%
PHL 99	16%	63%	15%	1%	1%	3%	0%	0%	0%	0%
LKA 95	1%	11%	9%	11%	31%	5%	2%	1%	0%	5%
LKA 96	2%	2%	1%	3%	0%	4%	0%	67%	0%	9%
LKA 97	3%	1%	1%	2%	0%	25%	0%	47%	0%	13%
LKA 98	2%	2%	9%	4%	0%	13%	0%	4%	24%	39%
LKA 99	0%	0%	85%	0%	11%	0%	0%	0%	0%	3%
THA 95	40%	6%	9%	3%	0%	20%	10%	6%	0%	1%
THA 96	52%	5%	7%	5%	0%	6%	18%	0%	0%	5%
THA 97	44%	10%	11%	4%	0%	4%	22%	1%	0%	1%
THA 98	66%	8%	5%	7%	0%	5%	3%	4%	0%	1%
THA 99	63%	6%	3%	10%	2%	0%	4%	5%	0%	1%
VNM 95	9%	8%	14%	1%	12%	0%	1%	3%	0%	50%
VNM 96	44%	0%	4%	5%	16%	4%	4%	16%	0%	1%
VNM 97	27%	1%	47%	3%	1%	0%	1%	15%	0%	3%
VNM 98	9%	9%	7%	4%	5%	0%	9%	3%	0%	5%
VNM 99	56%	3%	17%	4%	3%	0%	5%	3%	0%	0%

Philippines: Over the last 5 years, 92% of the export market value stems from HS code 854140 – photosensitive semiconductors. The Philippines are the second largest market in this category behind Hong Kong. The US export value has increased from $16m in 1995 to $213m in 1999, again overtaking the Germans.

India: A volatile market with 3 market share leaders in 5 years: The Danes, the Japanese, and the Italians. It's also the only LDC market besides the Philippines where the US sold more in1999 than in1995.

4.9 HE/REP Country Summaries

Total Import Market Size

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	1,827,893	496,282	837,046	1,536,077	14,907	1,138,043	1,219,557	1,267,526	672,583	1,061,339	50,116	10,121,368
1995	288,976	75,641	285,128	363,033	913	180,763	80,238	258,990	172,836	159,921	8,383	1,874,822
1999	530,169	51,988	112,515	260,105	5,353	260,549	337,934	259,392	109,785	226,461	15,767	2,170,018

Total Import Market Growth

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
$	241,193	(23,653)	(172,613)	(102,927)	4,440	79,787	257,696	402	(63,051)	66,539	7,383	295,196
%	83%	-31%	-61%	-28%	487%	44%	321%	0%	-36%	42%	88%	16%

Rank by Size Among US-AEP Countries

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam
1995-1999	1	9	7	2	11	5	4	3	8	6	10
1995	2	9	3	1	11	5	8	4	6	7	10
1999	1	9	7	4	11	3	2	5	8	6	10

US Export Value

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	100,590	154,074	87,710	201,058	260	274,642	780,069	240,854	45,894	146,463	2,343	2,033,957
1995	9,463	27,249	10,078	50,226	103	29,841	16,260	38,513	10,822	38,275	632	231,461
1999	51,049	8,928	14,937	12,979	-	71,611	212,936	50,222	6,345	38,934	419	468,362

ExportGrowth1995–1999

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
$	41,585	(18,320)	4,860	(37,246)	(103)	41,770	196,676	11,710	(4,477)	659	(213)	236,900
%	4.39	-67%	48%	-74%	-100%	140%	1210%	30%	-41%	2%	-34%	102%

US Market Share

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	6%	31%	10%	13%	2%	24%	64%	19%	7%	14%	5%	20%
1995	3%	36%	4%	14%	11%	17%	20%	15%	6%	24%	8%	12%
1999	10%	17%	13%	5%	0%	27%	63%	19%	6%	17%	3%	22%

US Marke tShare Rank

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	5	1	5	2	9	2	1	2	5	2	8	2
1995	5	1	5	2	4	3	2	2	5	2	5	2
1999	4	2	2	2	9	2	1	2	3	2	8	2

Market Share Leader

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	Japan	US	Japan	Japan	Ger.	Japan	US	Japan	Japan	Japan	Japan	Japan
1995	Japan	US	Denmark	Japan	China	Japan	Ger.	Japan	Japan	Japan	UK	Japan
1999	Japan	Japan	Japan	Japan	Ger.	Japan	US	Japan	Japan	Japan	Japan	Japan

US-AEP

United States–Asia
Environmental Partnership

U.S. Environmental Industry Export Competitiveness

Chapter 5. Monitoring & Analysis

October, 2001

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5.1 Executive Summary

The objective of this report is to evaluate U.S. environmental industry competitiveness in the market sector of environmental monitoring & analysis (M&A) equipment. This analysis will highlight areas of relative strength and weakness of U.S. M&A environmental exports within the US-AEP countries. These results can guide the efforts and attentions of both U.S. private industry and US-AEP.

U.S. companies accounted for approximately 25% of the total value of environmental exports worldwide in 1999. In the same year, German and Japanese competitors captured market shares of 19% and 15%, respectively. In the environmental monitoring & analysis sector, the U.S. enjoys a global leadership position with a market share of approximately 30%. German and Japanese competitors trail with 21% and 15%, respectively.

Across the US-AEP countries, however, U.S. M&A suppliers trail behind Japanese companies which have dominated the regional M&A export market for each of the last five years. But despite the historical success of Japanese suppliers in these markets, the margin enjoyed by the Japanese has shrunk consistently and dramatically over the same five-year period. In 1995, Japanese and U.S. market shares were 45% and 28%, respectively. By 1999, the Japanese market share of 37% was only marginally larger than the U.S. share of 35%. Both were trailed by Germany, which held steady throughout the period with a 10% to 11% market share. When looking at specific M&A commodities, Japanese suppliers dominated three of the five largest commodity categories in 1999.

Within the individual US-AEP countries, U.S. M&A performance has been mixed. In six of the US-AEP countries (Philippines, Taiwan, Vietnam, Hong Kong, Singapore and India), total M&A import markets have been growing at various levels. In five of those countries, not only have U.S. companies seen their exports increase along with the overall market, but have even gone on to capture a growing share of the newly expanded pie. However, in two other similarly expanding M&A export markets (Philippines and, to a lesser degree, India), U.S. vendors have actually seen their positions slip. In the remaining countries of Thailand, Korea, Indonesia, Malaysia and Sri Lanka, import markets have contracted but U.S. competitiveness has increased (with the exception of Indonesia where the U.S. position weakened somewhat).

5.2 The U.S. Is a Leader in Global Environmental Monitoring & Analysis Trade

The global export market for M&A equipment was approximately $44 billion in 1999, according to OECD/ETI data (Figure 5.1). Within the $44 billion M&A export market identified in the OECD/ETI data, the U.S. is the leading exporter with approximately $13.3 billion of total M&A export value. Stat Canada estimated that in 1997, the world market for industrial process controls (PCI) and automation equipment, including drives, amounted to approximately $54 billion. Bear in mind that both of these figures include a great deal of electronic instrumentation that is used not only for monitoring and analysis but actually include all manner of process controls. More importantly, all of this instrumentation is not used strictly for environmental applications. According to EBI, a more stringent definition of environmental monitoring and analysis equipment would be closer to $5 billion. Nevertheless, many of the private companies engaged in the export of instrumentation are, in general, the same companies that export environmental products as a subset of their overall business.

Figure 5.1 Global M&A Export Value by Major Country of Origin, 1995-1999

COUNTRY OF ORIGIN	1995	1996	1997	1998	1999	Total 1995-1999
US	10,118,647	10,466,637	11,938,993	12,347,241	13,343,526	58,215,044
Germany	8,266,060	8,610,469	8,508,034	9,108,162	9,301,902	43,794,627
Japan	7,172,646	6,974,796	6,988,424	5,709,646	6,390,369	33,235,881
UK	3,478,550	3,858,838	4,466,159	4,181,061	4,005,034	19,989,642
France	2,426,578	2,499,345	2,648,745	2,640,537	2,645,111	12,860,316
Italy	1,727,445	1,982,701	1,876,148	1,858,755	1,759,711	9,204,760
Netherlands	1,259,680	1,497,285	1,528,362	1,644,624	1,676,648	7,606,599
Canada	842,981	925,025	990,287	973,871	1,091,960	4,824,124
Sweden	897,739	878,424	799,613	871,839	910,527	4,358,142
Denmark	735,491	714,814	694,751	710,026	649,629	3,504,711
China	317,259	340,703	459,456	517,723	574,976	2,210,117
Austria	563,538	537,755	580,873	593,825	552,043	2,828,034
Taiwan	309,157	343,325	362,835	431,876	380,391	1,827,584
Australia	175,564	225,498	213,528	251,306	308,791	1,174,687
Korea	303,649	288,360	274,266	240,318	253,423	1,360,016
Grand Total	38,594,988	40,143,976	42,330,474	42,080,812	43,844,043	206,994,293

All values in thousands (000's) of US dollars

Figure 5.2 shows global M&A export market shares for the major exporters. In 1999, the U.S. led with a 30% share, followed by Germany and Japan with 21% and 15%, respectively. Between 1995 and 1999, the U.S. share has increased from 26% to 30%. During the same period, Germany held mostly steady while Japan saw a decrease from 19% to 15%.

Figure 5.2 Global M&A Export Market Share by Major Country of Origin, 1995-1999

COUNTRY OF ORIGIN	1995	1996	1997	1998	1999	Total 1995-1999
US	26%	26%	28%	29%	30%	28%
Germany	21%	21%	20%	22%	21%	21%
Japan	19%	17%	17%	14%	15%	16%
UK	9%	10%	11%	10%	9%	10%
France	6%	6%	6%	6%	6%	6%
Italy	4%	5%	4%	4%	4%	4%
Netherlands	3%	4%	4%	4%	4%	4%
Canada	2%	2%	2%	2%	2%	2%
Sweden	2%	2%	2%	2%	2%	2%
Denmark	2%	2%	2%	2%	1%	2%
China	1%	1%	1%	1%	1%	1%
Austria	1%	1%	1%	1%	1%	1%
Taiwan	1%	1%	1%	1%	1%	1%
Australia	0%	1%	1%	1%	1%	1%
Korea	1%	1%	1%	1%	1%	1%
Grand Total	100%	100%	100%	100%	100%	100%

In 1999....

US and Canada account for 32% of total M&A exports.

The listed EU countries account for 48% of total M&A exports.

The listed Asian countries account for 19% of total M&A exports.

According to a 1998 Stat Canada report on Process Automation, demand for process control, especially automated process control, is the primary driver for demand for monitoring and analysis equipment. As shown below in Figure 5.3, the demand side for process control and automation is dominated by the petrochemical and chemical manufacturing industries. We expect those industries will have the highest demand for monitoring and analysis equipment as well.

Figure 5.3 Global Market for Process Automation by Industry Sector, 1996

Petrochemicals/chemicals/pharmaceuticals	44%
Energy	15%
Food processing	15%
Pulp and paper	7.5%
Steel and iron	5%
Water and wastewater	5%
Others	6%

Figure 5.4 Global Market of Process Automation by Geographic Region, 1996

Western Europe	29.6%
North America	28.4%
Asia/Pacific (without Japan)	15.5%
Japan	13.7%
Eastern Europe	4.8%
South America	4.6%
Others	3.4%

Figure 5.5 Global Market of Process Automation by Geographic Region, 2006 (Forecast)

Western Europe	26.0%
North America	27.2%
Asia/Pacific (without Japan)	21.1%
Japan	12.3%
Eastern Europe	4.8%
South America	4.9%
Others	3.7%

As soon as the present financial crisis in the Asian markets is firmly settled, the Asian/Pacific markets (excluding Japan) should offer good business opportunities. Market insiders expect that in 2006 this region will show good growth rates in the process automation field while Western European and North American markets are expected to decrease slightly. In the midst of all this, the trend towards company acquisitions to enhance product ranges continues.

5.3 Japan and the U.S. Share the Lead in M&A Exports to US-AEP Countries

Figure 5.6 shows M&A exports to US-AEP countries. The total US-AEP M&A export market was approximately $6.8 billion in 1999. Japan is the leading exporter (in terms of total dollar value) with approximately $2.5 billion of total M&A export value. The U.S. follows closely with approximately $2.4 billion in exports. The next closest competitor in the region was Germany with M&A export revenues of $668 million.

Figure 5.6 M&A Export Value by Major Country of Origin Across All US-AEP Countries, 1995-1999

COUNTRY OF ORIGIN	1995	1996	1997	1998	1999	Total 1995-1999
Japan	3,281,348	3,216,153	3,241,973	2,133,184	2,509,207	14,381,865
US	2,014,629	2,168,316	2,436,367	2,003,228	2,366,776	10,989,316
Germany	734,934	857,726	774,052	674,338	668,844	3,709,894
UK	392,353	474,391	521,974	436,828	351,551	2,177,097
France	202,220	255,957	305,024	178,219	201,636	1,143,056
China	93,520	106,598	137,425	138,264	135,206	611,013
Taiwan	96,975	113,916	104,726	104,712	124,946	545,275
Italy	105,362	140,501	136,528	122,678	104,104	609,173
Sweden	106,529	82,836	76,418	79,566	84,827	430,176
Netherlands	59,656	57,149	60,486	48,354	62,179	287,824
Korea	62,183	81,378	62,666	49,826	56,971	313,024
Australia	32,362	50,290	56,424	46,700	52,618	238,394
Denmark	53,411	54,772	63,526	43,430	45,728	260,867
Canada	42,048	50,337	47,251	30,663	31,166	201,465
Austria	24,489	27,279	31,381	26,367	30,754	140,270
Grand Total	7,302,020	7,737,598	8,056,222	6,116,359	6,826,511	36,038,710

All values in thousands (000's) of US dollars

Figure 5.7 shows the total values converted to M&A export market shares among US-AEP countries. In 1999, Japan led with a 37% share, followed closely by the U.S. at 35% and distantly by Germany with 10%. Between 1995 and 1999, the U.S. share has increased significantly from 28% to 35%. During the same period, the market leader, Japan, saw a significant decrease in market share from 45% to 37%. Germany held steady in the 10% range. Other countries' performance was mixed.

Figure 5.7 M&A Export Market Share by Major Country of Origin Across All US-AEP Countries, 1995-1999

COUNTRY OF ORIGIN	1995	1996	1997	1998	1999	Total 1995-1999
Japan	45%	42%	40%	35%	37%	40%
US	28%	28%	30%	33%	35%	30%
Germany	10%	11%	10%	11%	10%	10%
UK	5%	6%	6%	7%	5%	6%
France	3%	3%	4%	3%	3%	3%
China	1%	1%	2%	2%	2%	2%
Taiwan	1%	1%	1%	2%	2%	2%
Italy	1%	2%	2%	2%	2%	2%
Sweden	1%	1%	1%	1%	1%	1%
Netherlands	1%	1%	1%	1%	1%	1%
Korea	1%	1%	1%	1%	1%	1%
Australia	0%	1%	1%	1%	1%	1%
Denmark	1%	1%	1%	1%	1%	1%
Canada	1%	1%	1%	1%	0%	1%
Austria	0%	0%	0%	0%	0%	0%
Grand Total	100%	100%	100%	100%	100%	100%

5.4 Another Opinion on U.S. Competitiveness in Asia

The OECD/ETI data shows that the U.S. is a dominant player in global environmental markets in general and in global environmental M&A markets specifically. However, in the M&A market segment in Asia, the U.S. takes a second seat to the Japanese across the US-AEP countries.

Environmental Business International shed some light on how U.S. firms stack up against the Japanese and the Germans in M&A export markets. EBI tracks a segment called "Instruments and Information Systems," which is the closest proxy for the M&A sector identified in the OECD/ETI data. However, as noted earlier, EBI's accounting is more strictly environmental when compared to the OECD/ETI data, which includes a significant amount of electronic and measurement instrumentation that has other applications.

EBI rated each country's ability to compete in each of the major environmental market segments. As shown, the U.S. is rated "E" for excellent. In contrast, both German and Japanese companies are rated "G" for good. This is consistent with U.S. companies' long-standing strong export performance in scientific and, specifically, environmental instrumentation. These strengths are supported by the OECD/ETI data. However, the OECD/ETI data also reveal the dominant, albeit declining, position of Japanese suppliers in US-AEP markets.

Figure 5.8 Relative Competitiveness of Environmental Industries

Equipment	US	Germ	Japan	F&UK	Dev'g
Water Equipment & Chemicals	G	G	GE	GE	MP
Air Pollution Control	OG	E	E	O	MP
Instruments & Info. Systems	E	G	G	O	P
Waste Mgmt Equipment	G	GE	OG	O	OM
Process & Prevention Tech.	P	P	M	P	P
Services					
Solid Waste Management	G	OG	OM	EG	MP
Hazardous Waste Mgmt	G	O	O	OG	P
Consulting & Engineering	GE	OG	M	OG	MP
Remediation/Industrial Svcs.	G	O	M	OM	P
Analytical Services	G	O	O	O	MP
Water Treatment Works	MP	M	MP	GE	MP
Resources					
Water Utilities	MP	MP	P	GE	MP
Resource Recovery	O	OG	O	O	MP
Environmental Energy	OG	OG	OG	OG	P
Rating	111	105	93	111	47

Source: Environmental Business International, Inc., San Diego,, E-excellent, G-good, O-OK, M-mediocre, P-poor
Based on ratings of technology, commercial orientation, management, finance, global presence, govt support,etc

Although the U.S. will likely continue as a strong global exporter of environmental instrumentation, Japan will continue to pose a significant threat in Asia and to US-AEP countries specifically. In addition, other regional suppliers will continue to develop their electronics and instrumentation capabilities and, in the long-term, will likely pose an increasing threat to established vendors from the U.S., Europe and even Japan.

5.5 Asia Regional M&A Trade by Commodity

Within the M&A segment, there are 42 main categories of commodity exports that are tracked in the OECD/ETI data. The top ten categories account for nearly 70% of total M&A export value to US-AEP countries and are listed below:

HS	HS Description
903089	Instruments & apparatus for measurg or checkg electrical quantities nes
903180	Measuring or checking instruments, appliances and machines, nes
903090	Parts & access for inst & app for meas or checkg electrical quantities
903289	Automatic regulating or controlling instruments and apparatus, nes
903039	Inst & app, for measurg or checkg voltage, current, etc w/o a record dev
902780	Instruments and apparatus for physical or chemical analysis, nes
903190	Parts & accessories for measuring or checking inst, appl & machines, nes
841410	Vacuum pumps
903290	Parts & access for automatic regulatg or controllg instruments & app, nes
902790	Microtomes; parts & access of inst & app for physical or chem analysis, nes

Many countries do not collect export data at greater than the 6-digit HS level, or track the ultimate application of such equipment, so although these categories undoubtedly include a great deal of environmental goods, other non-environmental commodities are, to some degree, included as well. Nevertheless, we believe that these figures are sufficiently robust that they provide a reasonably accurate picture of trade activity, particularly when the data are analyzed from a market share or time series perspective rather than in terms of absolute dollar value.

As shown below, the top five categories account for over (50%) of M&A commodity exports to US-AEP countries. In three out of five of those categories, Japan leads in export value to the region, followed by the U.S. Overall, Japan leads with a 46% market share over the U.S. at 37%. Both Japan and the U.S. dominate trade in these key M&A categories.

Figure 5.9 Export Values to US-AEP Countries by M&A Commodity in 1999

COUNTRY OF ORIGIN	903089 Instruments & apparatus for measurg or checkg electrical quantities nes	903180 Measuring or checking instruments, appliances and machines, nes	903090 Parts & access for inst & app for meas or checkg electrical quantities	903289 Automatic regulating or controlling instruments and apparatus, nes	903039 Inst & app, for measurg or checkg voltage, current, etc w/o a record dev	Total
Japan	636,930	509,498	236,814	231,167	42,905	1,657,313
US	445,239	168,510	372,270	98,133	217,764	1,301,917
Germany	5,387	134,526	59,983	42,748	17,177	259,821
UK	14,678	28,931	10,253	13,289	13,670	80,822
France	1,721	12,611	3,335	7,355	2,974	27,996
China	2,906	5,463	4,241	8,196	2,297	23,104
Taiwan	12,162	12,009	2,437	6,669	12,001	45,278
Italy	2,351	20,718	2,042	3,840	3,605	32,556
Sweden	483	13,741	407	6,850	4,093	25,573
Netherlands	1,087	2,322	1,170	8,803	2,998	16,380
Korea	2,021	7,870	3,172	2,435	9,464	24,961
Australia	2,731	5,706	10,696	2,358	801	22,292
Denmark	122	14,343	997	1,865	396	17,723
Canada	464	3,872	608	11,306	1,274	17,525
Austria	781	9,499	385	533	631	11,829
Grand Total	1,129,062	949,619	708,810	445,547	332,051	3,565,090

All values in thousands (000's) of US dollars

Figure 5.10 Export Market Shares to US-AEP Countries by M&A Commodity in 1999

COUNTRY OF ORIGIN	903089 Instruments & apparatus for measurg or checkg electrical quantities nes	903180 Measuring or checking instruments, appliances and machines, nes	903090 Parts & access for inst & app for meas or checkg electrical quantities	903289 Automatic regulating or controlling instruments and apparatus, nes	903039 Inst & app, for measurg or checkg voltage, current, etc w/o a record dev	Total
Japan	56%	54%	33%	52%	13%	46%
US	39%	18%	53%	22%	66%	37%
Germany	0%	14%	8%	10%	5%	7%
UK	1%	3%	1%	3%	4%	2%
France	0%	1%	0%	2%	1%	1%
China	0%	1%	1%	2%	1%	1%
Taiwan	1%	1%	0%	1%	4%	1%
Italy	0%	2%	0%	1%	1%	1%
Sweden	0%	1%	0%	2%	1%	1%
Netherlands	0%	0%	0%	2%	1%	0%
Korea	0%	1%	0%	1%	3%	1%
Australia	0%	1%	2%	1%	0%	1%
Denmark	0%	2%	0%	0%	0%	0%
Canada	0%	0%	0%	3%	0%	0%
Austria	0%	1%	0%	0%	0%	0%
Grand Total	100%	100%	100%	100%	100%	100%

5.6 United States Export Performance

This section focuses on the U.S. M&A export performance in the world, in Asia and among the US-AEP countries. U.S. M&A exports to Asia represented 31% of total U.S. M&A exports in 1999. The number is 18% when looking at US-AEP countries alone. Exports to countries outside of Asia accounted for 69% of U.S. M&A exports in the same year.

When we look at export trends over time, we see that Asia and the US-AEP countries have represented a decreasing share of total U.S. M&A exports between 1995 and 1999. In 1998, U.S. M&A export growth to Asia and the US-AEP countries declined precipitously by 11% and 18%, respectively. This trend was reversed in 1999 as US export sales reached the same levels as in 1997. This observation is certainly consistent with the challenge that the Asian economic crisis has presented to U.S. export industries overall and we would expect to see the trend reverse (as it may have already) as the regional economic recovery continues.

Figure 5.11 U.S. M&A Export Value, 1995-1999

	1995	1996	1997	1998	1999
U.S. Total Exports	10,118,647	10,466,637	11,938,993	12,347,241	13,343,526
Non–Asian	6,574,430	6,677,098	7,751,994	8,630,902	9,245,234
To Asia	3,544,218	3,789,539	4,186,998	3,716,340	4,098,292
To US AEP Countries	**2,014,629**	**2,168,316**	**2,436,367**	**2,003,228**	**2,366,776**

All values in thousands (000's) of US dollars

Figure 5.12 U.S. M&A Export Market Share, 1995-1999

	1995	1996	1997	1998	1999
U.S. Total Exports	100%	100%	100%	100%	100%
Non–Asian	65%	64%	65%	70%	69%
To Asia	35%	36%	35%	30%	31%
To US AEP Countries	**20%**	**21%**	**20%**	**16%**	**18%**

Figure 5.13 U.S. M&A Export Growth, 1995-1999

	1995	1996	1997	1998	1999
U.S. Total Exports	-	3%	14%	3%	8%
Non–Asian	-	2%	16%	11%	7%
To Asia	-	7%	10%	-11%	10%
To US AEP Countries	**-**	**8%**	**12%**	**-18%**	**18%**

Figure 5.14 U.S. M&A Exports to Asia and the World

DESTINATION	1995	1996	1997	1998	1999	Total 1995-1999
World	10,118,647	10,466,637	11,938,993	12,347,241	13,343,526	58,215,045
Japan	1,332,859	1,435,454	1,526,191	1,383,555	1,401,720	7,079,779
Taiwan	536,585	645,349	680,109	375,065	529,385	2,766,494
Korea	388,641	422,749	469,346	388,547	505,242	2,174,525
China	351,737	369,219	443,966	440,601	528,802	2,134,326
Singapore	196,731	185,769	224,440	329,556	329,796	1,266,291
Hong Kong	202,312	184,575	244,848	230,539	243,570	1,105,844
Thailand	208,147	194,448	232,878	185,141	227,335	1,047,949
India	127,827	151,767	128,318	103,087	124,066	635,065
Malaysia	87,158	97,043	79,935	131,916	87,766	483,818
Philippines	83,795	67,314	95,847	116,129	102,735	465,819
Indonesia	25,833	31,116	53,624	25,511	11,673	147,758
Vietnam	1,781	4,008	5,244	5,294	5,134	21,462
Sri Lanka	813	726	2,253	1,396	1,068	6,256

All values in thousands (000's) of US dollars

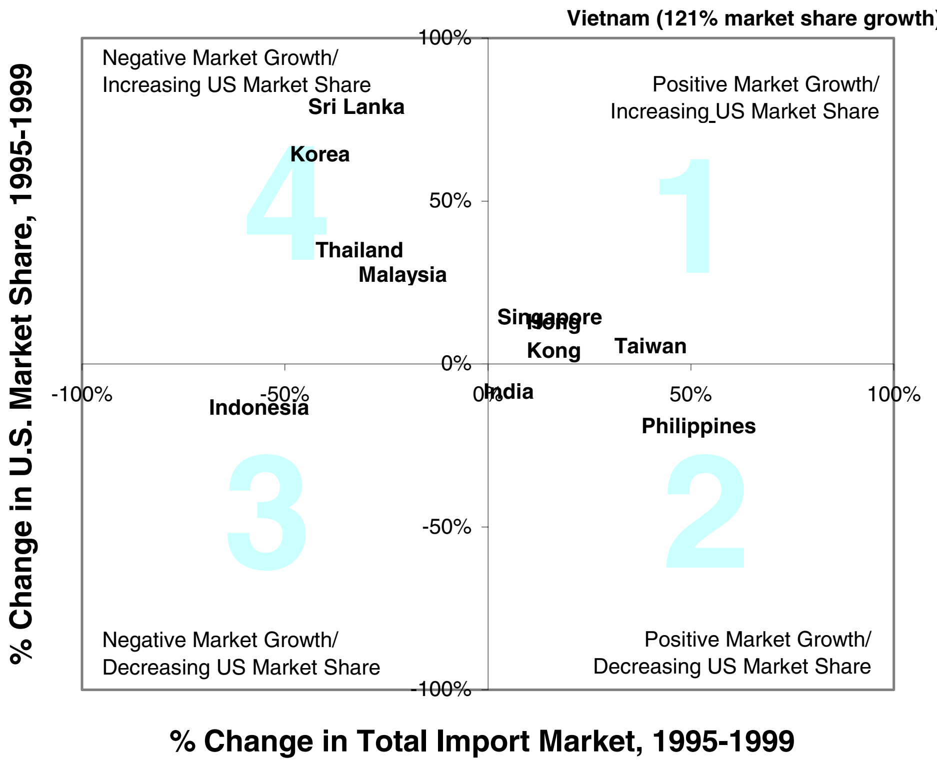
5.7 Priority Markets for U.S. Vendors and Priority Markets for US-AEP Assistance

M&A export markets across US-AEP countries have both expanded and contracted. However, in general, the drive towards increased automation and higher quality products/services standard across Asia has resulted in the adoption of high-tech processes and quality control equipment. Local governments are taking environmental and pollution control seriously, and as legislation is increasingly enforced, there will be opportunities in this area. An opposing force is the drop in global IT-related hardware markets where many of these hi-tech processes are employed. Such dynamic markets put pressure on the major market participants to adapt to changing conditions. Companies that don't adapt either miss opportunity in growing markets or over extend or over price in declining markets. Figures 5.15 and 5.16 below show two parameters for each US-AEP country: 1) total M&A export growth to that country, and 2) U.S. market share of those exports. For each country, the growth of overall exports is plotted against changes in U.S. market share. This shows how U.S. market share increased or decreased within the context of increasing or decreasing overall M&A export market size for each US-AEP country. In Figure 5.16, the horizontal axis shows the percent change in overall M&A market growth for each country. The vertical axis shows the percent change in U.S. market share. All data cover the years 1995 through 1999.

Figure 5.15 M&A Export Market Growth and U.S. Market Share Growth, 1995-1999

	Percent Change in Total M&A Import Market (1995 vs 1999)	Percent Change in U.S. Market Share (1995 vs 1999)
Hong Kong	16%	4%
India	6%	-5%
Indonesia	-52%	-6%
Korea	-40%	65%
Malaysia	-19%	34%
Philippines	57%	-22%
Singapore	17%	11%
Sri Lanka	-28%	81%
Taiwan	42%	6%
Thailand	-28%	35%
Vietnam	30%	121%

Figure 5.16 M&A Import Market Growth vs. U.S. Market Share, 1995-1999



Countries in Quadrant 1 (upper right), including Singapore, Hong Kong, Taiwan and Vietnam, show that overall exports of M&A equipment to those countries increased while U.S. market share of those exports increased as well. The U.S. did relatively well in maintaining or improving its position in those countries, particularly in Vietnam. Countries in Quadrant 2 (lower right), including Philippines and India, represent growing export markets but the U.S. market share of those growing opportunities has declined. This indicates that U.S. competitive position is slipping in those countries. Countries in Quadrant 3 (lower left), which includes only Indonesia, show an overall M&A export market in decline accompanied by a loss of U.S. market share. Quadrant 4 (upper left), including Malaysia, Thailand, Korea and Sri Lanka, show countries where the overall M&A export market is declining but the U.S. is nonetheless gaining ground. The U.S. made some significant competitive gains in those countries. Overall, U.S. exporters managed to maintain or improve market share quite well, particularly in markets that were in overall decline.

5.8 US and Competitors Market Share Positions in US-AEP Markets

Relative market share based on the cumulative export value for years 1995 through 1999 by the US and its competitors in US-AEP countries are shown below in Figure 5.17. Trends within those countries for the US and its top competitors in terms of export value to US-AEP countries in 1999 are shown in Figures 5.18 and 5.19. Together, these figures indicate significant resilience of the US M&A industry. As Figure 5.17 shows, in nine of the 11 US-AEP countries, the US either leads (Hong Kong, India, Singapore) or comes in second to Japan (Indonesia, Korea, Malaysia Philippines, Taiwan and Thailand). Only in Sri Lanka does the US register less than a double-digit share.

Figure 5.17 U.S. and Competitors M&A Market Share for 1995-1999 (cumulative)

Country	Worldwide	Hong Kong	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thai-land	Taiwan	Vietnam	Total US-AEP Countries
US	28%	29%	13%	24%	28%	8%	36%	32%	44%	24%	30%	10%	30%
Germany	21%	10%	11%	20%	13%	15%	7%	6%	10%	8%	8%	12%	10%
Japan	16%	23%	46%	17%	46%	34%	38%	49%	28%	46%	51%	30%	40%
UK	10%	8%	9%	17%	4%	18%	7%	3%	7%	5%	3%	4%	6%
France	6%	2%	5%	7%	3%	4%	3%	3%	2%	4%	3%	9%	3%
Italy	4%	3%	2%	5%	1%	3%	1%	0%	2%	2%	1%	5%	2%
Netherlands	4%	1%	1%	4%	0%	2%	1%	1%	1%	1%	0%	2%	1%
Canada	2%	1%	0%	1%	1%	0%	0%	0%	1%	1%	0%	0%	1%
Sweden	2%	2%	1%	1%	1%	1%	1%	1%	1%	2%	1%	1%	1%
Denmark	2%	1%	1%	1%	1%	1%	1%	0%	1%	1%	0%	1%	1%
Austria	1%	1%	1%	1%	0%	1%	0%	0%	0%	0%	0%	1%	0%
China	1%	8%	3%	1%	1%	7%	1%	1%	1%	1%	0%	12%	2%
Taiwan	1%	8%	1%	0%	0%	1%	1%	2%	1%	2%	0%	5%	2%
Korea	1%	1%	3%	1%	0%	4%	1%	2%	0%	2%	1%	5%	1%
Australia	1%	1%	2%	1%	0%	2%	1%	0%	1%	1%	0%	2%	1%
Grand Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Value of Mkt	206,994	3,754	1,134	1,981	9,764	78	2,908	1,476	4,907	2,655	7,164	215	36,039

All values in millions (000,000's) of US dollars

Figures 5.18 and 5.19 (Advanced Developing Countries and Less Developed Countries, respectively) reveals trends within the US-AEP countries by the US and its top competitors in the region. In the ADCs, between 1995 and 1999, US export value had increased by more than 20%. By 1999, the US had overtaken the Japanese in export value to the ADCs - $2b vs $1.94b. Comparing US market share figures for 1995 and 1999, the US has maintained or increased market share in every US-AEP country except for India and the Philippines. Although Japan shows remarkable dominance in Indonesia, Philippines, Taiwan, and Thailand, with approximately 50% of the market share, it has lost market share in eight US-AEP countries: Hong Kong, Indonesia, Korea, Malaysia Singapore Sri Lanka, Taiwan, and Vietnam.

Figure 5.18 M&A Market Share Trends, 1995-1999 - ADCs (Advanced Developing Countries)

Country	US	JPN	GER	UK	FR	TWN	ITA	CHN
HK 95	30%	26%	10%	9%	2%	6%	3%	1%
HK 96	26%	24%	11%	10%	2%	6%	3%	1%
HK 97	30%	23%	9%	9%	3%	8%	4%	1%
HK 98	29%	21%	10%	8%	3%	11%	3%	1%
HK 99	31%	22%	9%	7%	2%	9%	3%	1%
KOR 95	23%	55%	12%	3%	3%	1%	1%	0%
KOR 96	25%	50%	13%	4%	2%	1%	1%	0%
KOR 97	29%	45%	12%	4%	3%	1%	1%	0%
KOR 98	35%	33%	14%	6%	3%	1%	1%	0%
KOR 99	37%	36%	13%	5%	3%	1%	1%	1%
MYS 95	31%	45%	8%	8%	2%	0%	1%	0%
MYS 96	34%	39%	9%	6%	2%	0%	1%	1%
MYS 97	37%	36%	7%	9%	3%	1%	2%	1%
MYS 98	40%	37%	8%	7%	1%	0%	2%	0%
MYS 99	41%	32%	4%	7%	8%	1%	1%	1%
SGP 95	42%	31%	8%	7%	2%	1%	2%	1%
SGP 96	44%	28%	10%	7%	2%	1%	2%	1%
SGP 97	45%	28%	9%	8%	2%	1%	2%	1%
SGP 98	44%	24%	12%	7%	3%	1%	2%	1%
SGP 99	46%	27%	10%	6%	2%	1%	1%	1%
TWN 95	31%	53%	7%	3%	2%	0%	1%	0%
TWN 96	29%	50%	7%	4%	5%	0%	1%	0%
TWN 97	27%	52%	7%	3%	6%	0%	1%	0%
TWN 98	30%	50%	10%	4%	2%	1%	1%	0%
TWN 99	32%	49%	9%	3%	2%	1%	1%	0%

In the ADCs, US and Japan dominate with more than 70% of the market.

In 1995, Japan's M&A export value to the ADCs ($2.7b) was 60% more than the US ($1.7b). By 1999, the US export value had increased by over 20% ($2b) to the ADCs and was 4% more than Japan's.

KOREA – US now is the market share leader after increasing its market share by 60% since 1995. During the same period, Japan's market share decrease by 35%

MALAYSIA – US Market share increased by 33% since 1995. Japan's market share decrease by 28%.

Figure 5.19 M&A Market Share Trends, 1995-1999 - LDCs (Less Developed Countries)

Country	US	JPN	GER	UK	FR	TWN	ITA	CHN
IND 95	24%	17%	23%	15%	8%	1%	4%	3%
IND 96	25%	14%	21%	18%	8%	1%	4%	3%
IND 97	22%	17%	20%	18%	6%	2%	5%	5%
IND 98	28%	17%	16%	18%	6%	1%	6%	3%
IND 99	23%	21%	19%	14%	6%	1%	3%	6%
IDN 95	11%	54%	14%	3%	4%	2%	2%	1%
IDN 96	10%	49%	15%	7%	5%	2%	3%	0%
IDN 97	17%	43%	7%	8%	6%	4%	3%	1%
IDN 98	14%	38%	9%	23%	3%	2%	1%	1%
IDN 99	11%	48%	9%	6%	2%	5%	1%	0%
PHL 95	37%	41%	7%	6%	2%	1%	1%	0%
PHL 96	24%	52%	5%	3%	3%	1%	0%	0%
PHL 97	31%	46%	7%	4%	4%	2%	1%	0%
PHL 98	38%	45%	7%	2%	2%	1%	0%	0%
PHL 99	29%	56%	5%	1%	1%	1%	0%	1%
LKA 95	5%	42%	15%	15%	2%	17%	1%	0%
LKA 96	5%	45%	13%	14%	5%	6%	2%	1%
LKA 97	13%	33%	15%	15%	4%	1%	5%	0%
LKA 98	10%	20%	16%	35%	2%	1%	4%	1%
LKA 99	8%	27%	16%	13%	6%	8%	2%	7%
THA 95	21%	49%	6%	4%	3%	1%	2%	2%
THA 96	24%	41%	9%	6%	6%	2%	2%	1%
THA 97	22%	48%	8%	8%	3%	1%	2%	1%
THA 98	28%	44%	11%	5%	3%	1%	2%	1%
THA 99	28%	49%	6%	4%	2%	2%	2%	0%
VNM 95	5%	28%	13%	3%	8%	21%	2%	3%
VNM 96	8%	26%	13%	2%	6%	12%	17%	2%
VNM 97	13%	33%	13%	4%	12%	9%	1%	2%
VNM 98	11%	38%	10%	4%	9%	9%	2%	1%
VNM 99	12%	25%	11%	7%	13%	12%	2%	1%

Japan maintains its overall US-AEP market share lead by dominating in the LDCs. In 1999, Japan led the US by over $230m in export value in the LDCs.

Philippines: Japan continues to grab market share. Since 1995, Japan has more than doubled its M&A export value ($92m to $199m).

Thailand- US has been able to increase its market share primarily be maintaining a yearly export value of approx.$125m. Japan's export value has declined by almost 30% since 1995 ($302m down to $219m in 1999).

5.9 Additional Country Commentaries

According to an Industry Sector Analysis (ISA) produced in 1998 by USFCS, "The total Indian market for process control, instrumentation, monitoring, testing, and analytical equipment for pollution control amounted to $72 million in 1996, and is expected to grow at an average annual growth rate of about 15-20 percent in the next three years reaching a level of $125 million by the year 2000." The OECD/ETI figures, covering at least the equipment but not services categories, do not corroborate that level of growth unless domestically manufactured supply of these goods has grown dramatically in recent years.

Malaysia is a US-AEP country with a declining market growth rate according to OECD/ETI data. But a publication of the British High Commission (BHC) in Malaysia states, "Industry sources assess the overall market size to be around RM500 million yearly, with average growth of 10-20% per annum in 1999-2001." This is certainly more optimistic than the OECD/ETI data that shows a total market decline between 1995 and 1999 of -19%. Reconciling the BHC figures with those provided by OECD/ETI might only be possible if this sector has experienced significant growth in domestically manufactured supply and/or if the sector has made a remarkable turnaround within the last eighteen months, beyond the time frame of the OECD/ETI data. Emerging OECD/ETI data will have to be reviewed to confirm this.

Also according to the BHC report, "…the market in Malaysia is dominated by USA (Honeywell, Rosemount, Fisher), Japan (Yokogawa), Italy (Hanna) and also some UK companies being represented. Statistical process control is fast catching up and should present good opportunities." The overall picture revealed by the OECD/ETI data is that although the import market has contracted, U.S. market share has improved nicely by 34%. Even more impressive competitive gains in declining markets were enjoyed by U.S. companies in Sri Lanka, Korea and Thailand.

According to an ISA prepared by the USFCS in 1999, Singapore's manufacturing activities provide good market opportunities for U.S. firms to supply instrumentation and control test equipment and services. The ISA figure below shows that the total market size is growing 17% from 1998 to 1999. This general growth is at least partially supported by the OECD/ETI data that shows total growth, at least in the import sector, of 17% over the entire 1995 to 1999 period.

Figure 5.20 Singapore Instrumentation and Control Equipment and Services

	1997	1998	1999
A. Total Market Size	1478	1166	1370
B. Total Local Production	424	507	550
C. Total Exports	949	938	980
D. Total Imports	2004	1598	1800
E. Imports from U.S.	952	765	920

Source: USFCS, ISA 1999 Singapore

"[Singapore's] petrochemical and petroleum industries are growing with a combined annual output of about US$12 billion -creating demand for M&A equipment and services. Pharmaceutical and semiconductor industries are also experiencing robust growth. Opportunities also abound in the infrastructural, environmental, pulp & paper and power markets in Singapore and the Asian region."

According to the Instrumentation Sensors and Automation Society (ISAS), a few key manufacturers and suppliers dominate the world's sensor market. The new global creed is simple: provide one-stop shopping for all client needs. That means smaller suppliers will have to be more creative, even while they now find it more difficult to compete in the saturated North American and European markets. As industrial development in Asia and Latin America grows and the playing field expands, it will help maintain a high level of demand for sensors. But, part of the real game-winning strategy, and a key to future market success, is better technical service and support.

The new industrial trend is quite clear: acquisition and one-stop shopping. Large suppliers such as Fisher-Rosemount, Elsag-Bailey (recently purchased by giant ABB), and Siebe Control Systems have acquired other firms to complete their product lines and become one-stop providers for process and automation needs. Smaller firms, on the other hand, have become more focused on a particular region or industry. They'll have to scramble to remain competitive.

In the next 2-5 years, we believe we'll see a majority of these companies shift their focus from a manufacturing concentration to a more marketing and customer-oriented mindset. For the end users, this means better everything: after-sales support, availability of products, awareness, education, and delivery time.

We believe that establishing a global framework will be one of the most important steps a sensor supplier will take in the twenty-first century. Changes could include companies relocating manufacturing facilities, securing alliances with other suppliers and entering into marketing agreements with foreign entities.

5.10 M&A Country Summaries

Total Import Market Size

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	3,754,459	1,134,453	1,981,304	9,764,075	78,248	2,908,474	1,476,413	4,907,361	2,654,541	7,164,425	214,958	36,038,711
1995	677,664	224,823	365,431	2,375,457	17,913	681,828	225,011	926,985	622,944	1,150,963	33,002	7,302,020
1999	782,883	107,652	388,750	1,417,377	12,986	554,798	353,579	1,088,821	447,620	1,629,064	42,981	6,826,511

Total Import Market Growth

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
$	105,219	(117,171)	23,319	(958,080)	(4,927)	(127,030)	128,568	161,837	(175,324)	478,101	9,980	(475,509)
%	16%	-52%	6%	-40%	-28%	-19%	57%	17%	-28%	42%	30%	-7%

Rank by Size Among US-AEP Countries

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam
1995-1999	4	9	7	1	11	5	8	3	6	2	10
1995	5	9	7	1	11	4	8	3	6	2	10
1999	4	9	7	2	11	5	8	3	6	1	10

US Export Value

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	1,105,844	147,758	483,818	2,766,494	6,256	1,047,949	465,819	2,174,525	635,065	2,134,326	21,462	10,989,316
1995	202,312	25,833	87,158	536,585	813	208,147	83,795	388,641	127,827	351,737	1,781	2,014,629
1999	243,570	11,673	87,766	529,385	1,068	227,335	102,735	505,242	124,066	528,802	5,134	2,366,776

ExportGrowth1995–1999

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
$	41,258	(14,160)	609	(7,201)	255	19,188	18,940	116,601	(3,761)	177,065	3,354	352,148
%	0.20	-55%	1%	-1%	31%	9%	23%	30%	-3%	50%	188%	17%

US Market Share

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	29%	13%	24%	28%	8%	36%	32%	44%	24%	30%	10%	30%
1995	30%	11%	24%	23%	5%	31%	37%	42%	21%	31%	5%	28%
1999	31%	11%	23%	37%	8%	41%	29%	46%	28%	32%	12%	35%

US Marke tShare Rank

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	1	2	1	2	4	2	2	1	2	2	4	2
1995	1	3	1	2	5	2	2	1	2	2	7	2
1999	1	2	1	1	5	1	2	1	2	2	3	2

Market Share Leader

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	US	Japan	US	Japan	Japan	Japan	Japan	US	Japan	Japan	Japan	Japan
1995	US	Japan	US	Japan	Japan	Japan	Japan	US	Japan	Japan	Japan	Japan
1999	US	Japan	US	US	Japan	US	Japan	US	Japan	Japan	Japan	Japan

US-AEP

United States–Asia
Environmental Partnership

U.S. Environmental Industry Export Competitiveness

Chapter 6. Solid & Hazardous Waste, Other Recycling Systems and Remediation and Cleanup

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6.1 Executive Summary

The objective of this report is to evaluate U.S. environmental industry competitiveness specifically in the combined market sectors of Solid & Hazardous Waste (SH), Other Recycling Systems (ORS) and Remediation and Cleanup (RC). Together, these sectors are hereafter referred to collectively as Solid Waste Management (SWM). The results of this analysis will highlight areas of relative strength and weakness of U.S. SWM exports globally and within the US-AEP countries. These results are to help guide the efforts and attentions of both U.S. private industry and US-AEP.

U.S. companies accounted for approximately 25% of the total value of environmental exports worldwide in 1999. In the same year, German and Japanese competitors captured market shares of 19% and 15% respectively. In the sector of Solid Waste Management (SWM), the U.S. is the second largest exporter behind Japan. Between 1995 and 1999, Japan achieved a cumulative market share of 26% while the U.S. followed at 24%. However, in 1989 and 1999, the most recent years for which data are available, the U.S. actually matched or exceeded Japanese performance. During the 1995-99 period, Germany and Italy held 16% and 11% market shares respectively.

Among the US-AEP countries specifically, U.S. SWM suppliers fell well behind their Japanese counterparts who dominated regional SWM exports with a 48% cumulative share during the 1995-99 period. The U.S. trailed at 28%, followed distantly by Germany and Italy at 6% and 5% respectively. Despite the relatively poor performance of the U.S. during the period overall, the U.S. position steadily improved year to year. In contrast, Japanese market share saw slight declines.

Within the individual US-AEP countries, U.S. SWM export performance has been fairly steady. Exceptions include Singapore where the U.S. improved its market share considerably and the Philippines where U.S market share slipped by a similarly large margin.

6.2 The U.S. Is a Leader in Global Environmental Solid Waste Management Trade

Figure 6.1 shows global SWM exports ranked by country of origin according to cumulative exports from 1995 to 1999. Over the five-year period, the total SWM export market was approximately $126 billion. From 1995 to 1999, Japan was the leading worldwide exporter of SWM equipment with a cumulative total of approximately $32.7 billion of exports. Over the same period, the U.S. followed closely with a cumulative total of approximately $29.7 billion, followed by Germany and Italy at $19.6 billion and $13.5 billion respectively. In 1999 alone, global exports of HE/REP equipment totaled $25.4 billion. In the same year, Japan and the U.S. each saw global SWM exports of approximately $6.5 billion.

Figure 6.1 Global SWM Export Value by Major Country of Origin by, 1995-1999

COUNTRY OF ORIGIN	1995	1996	1997	1998	1999	Total 1995-99
Japan	7,426,150	6,925,140	6,765,382	5,000,212	6,533,599	32,650,483
US	5,497,351	5,846,800	6,366,980	5,486,942	6,536,248	29,734,321
Germany	3,784,531	3,909,552	3,892,073	4,025,655	3,946,742	19,558,554
Italy	2,921,729	2,902,358	2,782,874	2,487,030	2,450,070	13,544,062
UK	1,494,350	1,626,877	1,885,644	1,887,623	1,567,871	8,462,366
France	1,033,820	921,183	850,025	783,048	787,671	4,375,746
Korea	429,253	606,787	903,740	574,797	618,731	3,133,308
Netherlands	662,839	677,500	566,592	429,857	487,656	2,824,445
Sweden	551,679	486,660	435,993	475,095	451,535	2,400,963
Canada	302,194	368,209	493,639	537,726	548,675	2,250,443
Austria	358,442	366,347	357,611	393,264	471,563	1,947,227
Taiwan	354,901	419,107	318,916	279,995	326,498	1,699,417
China	261,701	335,234	325,320	249,211	309,323	1,480,789
Denmark	285,365	272,024	194,419	219,370	243,212	1,214,389
Australia	150,003	167,518	174,016	268,606	97,700	857,842
Grand Total	25,514,309	25,831,295	26,313,226	23,098,432	25,377,093	126,134,355

All values in thousands (000's) of US dollars

Figure 6.2 shows global SWM export market shares from 1995 to 1999. During the period, Japan's cumulative exports represented 26% of the total market, followed by the U.S. at 24% and Germany and Italy at 16% and 11% respectively. The Japanese saw some decline in market share during the period while the U.S. saw a steady increase. In fact, the U.S. share surpassed the Japanese in 1998 and was roughly equal in 1999, indicating that the U.S. may have all but closed any gap with the Japanese. Emerging data will have to be monitored in order to confirm or deny this trend toward U.S. leadership. During the same period, Germany and Italy held roughly steady.

Figure 6.2 Global SWM Export Market Share by Major Country of Origin, 1995-1999

COUNTRY OF ORIGIN	Total 95	Total 96	Total 97	Total 98	Total 99	Total 1995-99
Japan	29%	27%	26%	22%	26%	26%
US	22%	23%	24%	24%	26%	24%
Germany	15%	15%	15%	17%	16%	16%
Italy	11%	11%	11%	11%	10%	11%
UK	6%	6%	7%	8%	6%	7%
France	4%	4%	3%	3%	3%	3%
Korea	2%	2%	3%	2%	2%	2%
Netherlands	3%	3%	2%	2%	2%	2%
Sweden	2%	2%	2%	2%	2%	2%
Canada	1%	1%	2%	2%	2%	2%
Austria	1%	1%	1%	2%	2%	2%
Taiwan	1%	2%	1%	1%	1%	1%
China	1%	1%	1%	1%	1%	1%
Denmark	1%	1%	1%	1%	1%	1%
Australia	1%	1%	1%	1%	0%	1%
Grand Total	100%	100%	100%	100%	100%	100%

6.3 Japan and the U.S. Share the Lead in SWM Exports to US-AEP Counties

Figure 6.3 shows SWM exports to US-AEP countries ranked by country of origin according to cumulative exports from 1995 to 1999. Over the five-year period, the total US-AEP SWM export market was approximately $38.3 billion. Japan was the dominant exporter (in terms of total dollar value) with approximately $18.5 billion of total SWM export value. The U.S. followed in second place with approximately $10.6 billion in exports. In third place over the 1995-99 period was Germany at approximately $2.5 billion. It is worth noting, however, that early in the period, Italian exports had actually exceeded those of Germany in 1995 and 1996 before dropping off sharply after 1997. Overall, the U.S., which was closely competitive against the Japanese in global markets, has performed less effectively among the US-AEP countries.

Figure 6.3 SWM Export Value by Major Country of Origin Across All US-AEP Countries, 1995-1999

COUNTRY OF ORIGIN	1995	1996	1997	1998	1999	Total 1995-99
Japan	4,220,647	3,955,261	3,811,305	2,515,109	3,997,639	18,499,960
US	**2,066,652**	**2,179,402**	**2,247,608**	**1,693,517**	**2,415,745**	**10,602,923**
Germany	494,366	516,979	543,043	415,002	517,000	2,486,390
Italy	513,296	557,051	450,557	208,422	181,384	1,910,709
Taiwan	242,799	287,661	196,922	159,411	195,434	1,082,227
UK	202,347	228,848	211,109	149,143	142,474	933,922
Korea	109,331	311,231	173,346	121,668	168,587	884,164
France	107,685	107,452	97,067	79,023	55,087	446,314
Australia	76,952	68,720	61,094	184,794	37,460	429,020
China	76,452	96,940	93,358	50,987	55,272	373,007
Austria	28,756	26,118	23,900	23,662	76,752	179,188
Sweden	42,670	48,453	33,083	25,389	25,239	174,832
Netherlands	26,159	35,032	30,411	15,567	18,259	125,429
Canada	13,229	14,170	56,424	12,642	14,620	111,084
Denmark	32,816	30,109	10,513	12,127	16,641	102,206
Total To US-AEP Countries	8,254,156	8,463,428	8,039,738	5,666,462	7,917,592	38,341,375

All values in thousands (000's) of US dollars

Figure 6.4 shows the total values converted to SWM export market shares among US-AEP countries, again ranked by cumulative 1995-99 market share. Over the five-year period, Japan led with a cumulative 48% share, followed by the U.S. at 28% and Germany and Italy at 6% and 5% respectively. Although the U.S. position has been weak relative to the Japanese, the U.S. share did grow significantly from 25% to 31% between 1995 and 1999. During the same period, the Japanese share declined slightly. Germany saw some gains while Italian SWM exports and market share fell significantly.

Figure 6.4 SWM Export Market Share by Major Country of Origin Across All US-AEP Countries, 1995-1999

COUNTRY OF ORIGIN	1995	1996	1997	1998	1999	Total 1995-99
Japan	51%	47%	47%	44%	50%	48%
US	**25%**	**26%**	**28%**	**30%**	**31%**	**28%**
Germany	6%	6%	7%	7%	7%	6%
Italy	6%	7%	6%	4%	2%	5%
Taiwan	3%	3%	2%	3%	2%	3%
UK	2%	3%	3%	3%	2%	2%
Korea	1%	4%	2%	2%	2%	2%
France	1%	1%	1%	1%	1%	1%
Australia	1%	1%	1%	3%	0%	1%
China	1%	1%	1%	1%	1%	1%
Austria	0%	0%	0%	0%	1%	0%
Sweden	1%	1%	0%	0%	0%	0%
Netherlands	0%	0%	0%	0%	0%	0%
Canada	0%	0%	1%	0%	0%	0%
Denmark	0%	0%	0%	0%	0%	0%
Total To US-AEP Countries	100%	100%	100%	100%	100%	100%

6.4 Another Opinion on U.S. Competitiveness in Asia

The OECD/ETI data shows that the U.S. is a dominant player in global environmental markets in general and is highly competitive in global environmental SWM markets specifically. However, in the SWM market segment in Asia, the U.S. takes a second (although improving) seat to the Japanese across the US-AEP countries.

Environmental Business International shed some light on how U.S. firms stack up against the Japanese and other competitors in SWM export markets. EBI defines and tracks the following four segments that capture the combined SWM sector as utilized in this analysis:

- Waste Management Equipment,
- Solid Waste Management
- Remediation/Industrial Services
- Resource Recovery (Recycling)

EBI rated several countries' ability to compete in each of these environmental market segments. As shown in Figure 6.5, the U.S. is rated "G" or good in all of these segments with the exception of Resource Recovery where the U.S. was ranked "O" for OK. Other key competitors received various rankings depending on the specific segment. Across the segments, Germany was ranked roughly similar to the U.S. Japan was ranked somewhat weaker than the U.S.

Figure 6.5 Relative Competitiveness of Environmental Industries

Equipment	**US**	**Germ**	**Japan**	**F&UK**	**Dev'g**
Water Equipment & Chemicals	G	G	GE	GE	MP
Air Pollution Control	OG	E	E	O	MP
Instruments & Info. Systems	E	G	G	O	P
Waste Mgmt Equipment	G	GE	OG	O	OM
Process & Prevention Tech.	P	P	M	P	P
Services					
Solid Waste Management	G	OG	OM	EG	MP
Hazardous Waste Mgmt	G	O	O	OG	P
Consulting & Engineering	GE	OG	M	OG	MP
Remediation/Industrial Svcs.	G	O	M	OM	P
Analytical Services	G	O	O	O	MP
Water Treatment Works	MP	M	MP	GE	MP
Resources					
Water Utilities	MP	MP	P	GE	MP
Resource Recovery	O	OG	O	O	MP
Environmental Energy	OG	OG	OG	OG	P
Rating	111	105	93	111	47

Source: Environmental Business International, Inc., San Diego,, E-excellent, G-good, O-OK, M-mediocre, P-poor
Based on ratings of technology, commercial orientation, management, finance, global presence, govt support,etc

6.5 Asia Regional SWM Trade by Commodity

Within the SWM segment, there are eighteen main categories of commodity exports that are tracked in the OECD/ETI data. The top six categories account for the vast majority (95%) of total SWM export value to US-AEP countries and are listed below:

HS	**HS Description**
847989	Machines & mechanical appliances nes having individual functions
847290	Office machines, nes
851430	Industrial & laboratory electric furnaces & ovens nes
847490	Pts of sortg/screeng/mixg/crushg/grinding/washing/agglomeratg mach etc
841790	Parts of industrial/lab furnaces & ovens inc incinerators non-electr nes
851410	Industrial & laboratory electric resistance heated furnaces & ovens

Many countries do not collect export data at greater than the 6-digit HS level or track the ultimate application of such equipment, so it is not possible to fully decompose these figures in order to identify strictly environmental uses. Nevertheless, we believe that these figures are sufficiently robust that they provide a reasonably accurate picture of trade activity, particularly when the data are analyzed from a market share or time series perspective rather than in terms of absolute dollar value.

As shown below, the top six categories account for almost 95% of SWM commodity exports to US-AEP countries in 1999. And in five out of six of those categories, Japan leads in export value to the region, followed by the U.S. and Germany, which trade second place depending on the commodity. Overall, Japan leads with a 49% market share over the U.S. at 30%. Overall, Germany trails distantly in third place with a 7% market share. It is worth noting that in commodity category 847290, UK is the leading exporter to US-AEP countries.

Figure 6.6 Export Values to US-AEP Countries by SWM Commodity in 1999

COUNTRY OF ORIGIN	847989 Machines & mechanical appliances nes having individual functions	847290 Office machines, nes	851430 Industrial & laboratory electric furnaces & ovens nes	847490 Pts of sortg/screeng/mixg/crushg/grinding/washing/agglomeratg mach etc	841790 Parts of industrial/lab furnaces & ovens inc incinerators non-electr nes	851410 Industrial & laboratory electric resistance heated furnaces & ovens	Total SWM
Japan	3,705,891	53,313	22,360	24,201	37,084	65,286	4,048,584
US	2,142,858	46,670	97,939	18,346	19,136	30,151	2,440,152
Germany	394,964	29,776	29,229	24,765	20,463	7,439	577,131
Taiwan	142,324	5,472	4,059	7,126	2,386	735	211,047
Italy	128,031	342	1,180	10,740	14,172	904	207,361
Korea	146,148	8,438	3,686	5,283	903	1,213	178,117
UK	47,129	70,562	1,782	22,164	1,308	1,762	168,555
Austria	71,614	23	370	1,026	1,370	697	78,196
China	27,948	13,186	987	8,457	185	1,111	71,317
France	19,483	11,791	2,005	1,672	4,269	2,741	63,037
Australia	19,683	580	1,001	17,859	1,914	161	58,065
Sweden	19,870	797	-	2,074	459	840	29,741
Denmark	1,969	580	5	10,424	10,859	13	28,824
Netherlands	9,399	1,351	3,420	278	526	1,733	18,744
Canada	9,780	4,179	-	63	77	-	14,761
Grand Total	6,887,091	247,060	168,024	154,480	115,111	114,786	8,193,633

All values in thousands (000's) of US dollars

Please note that the HS code 847989 accounts for 84% of the export value of the major competitors to US-AEP countries. In 1999, this HS code accounted for 88% of US export value to US-AEP countries in the solid and hazardous waste sector. Equipment, e.g. chemical vapor, and physical deposition apparatus, related to the semi-conductor industry accounts for more than 70% of the US export value for this HS code.

Figure 6.7 Major Country of Origin Market Share by SWM Commodity in 1999

COUNTRY OF ORIGIN	847989 Machines & mechanical appliances nes having individual functions	847290 Office machines, nes	851430 Industrial & laboratory electric furnaces & ovens nes	847490 Pts of sortg/screeng/mixg/crushg/grinding/washing/agglomeratg mach etc	841790 Parts of industrial/lab furnaces & ovens inc incinerators non-electr nes	851410 Industrial & laboratory electric resistance heated furnaces & ovens	Total SWM
Japan	54%	22%	13%	16%	32%	57%	49%
US	31%	19%	58%	12%	17%	26%	30%
Germany	6%	12%	17%	16%	18%	6%	7%
Taiwan	2%	2%	2%	5%	2%	1%	3%
Italy	2%	0%	1%	7%	12%	1%	3%
Korea	2%	3%	2%	3%	1%	1%	2%
UK	1%	29%	1%	14%	1%	2%	2%
Austria	1%	0%	0%	1%	1%	1%	1%
China	0%	5%	1%	5%	0%	1%	1%
France	0%	5%	1%	1%	4%	2%	1%
Australia	0%	0%	1%	12%	2%	0%	1%
Sweden	0%	0%	0%	1%	0%	1%	0%
Denmark	0%	0%	0%	7%	9%	0%	0%
Netherlands	0%	1%	2%	0%	0%	2%	0%
Canada	0%	2%	0%	0%	0%	0%	0%
Percent of Total SWM	84%	3%	2%	2%	1%	1%	1%

6.6 United States Export Performance

This section looks briefly but specifically at U.S. SWM export performance in the world, in Asia and among the US-AEP countries. U.S. SWM exports to Asia represented 51% of total U.S. SWM exports in 1999. The number is 37% when looking at US-AEP countries alone. Exports to countries outside of Asia accounted for 49% of U.S. SWM exports in the same year.

When we look at export trends over time, we see that Asia and the US-AEP countries have represented a decreasing share of total U.S. SWM exports between 1995 and 1998 before recovering in 1999. In 1998, U.S. SWM export growth to Asia and the US-AEP countries declined precipitously at –25% across the entire region. But 1999 saw an apparent recovery to former levels or better. This observation is certainly consistent with the challenge that the Asian economic crisis has presented to U.S. export industries overall and we would expect to see the negative trend reverse (as it may have already) as the regional economic recovery continues.

Figure 6.8 U.S. SWM Export Value, 1995-1999

	1995	1996	1997	1998	1999
US Total Exports	5,497,351	5,846,800	6,366,980	5,486,942	6,536,248
Non- Asian	2,425,071	2,526,853	3,099,074	3,042,095	3,201,237
To Asia	3,072,280	3,319,947	3,267,906	2,444,847	3,335,011
To US AEP Countries	**2,066,652**	**2,179,402**	**2,247,608**	**1,693,517**	**2,415,745**

All values in thousands (000's) of US dollars

Figure 6.9 U.S. SWM Export Market Share, 1995-1999

	1995	1996	1997	1998	1999
US Total Exports	100%	100%	100%	100%	100%
Non-Asian	44%	43%	49%	55%	49%
To Asia	56%	57%	51%	45%	51%
To US AEP Countries	**38%**	**37%**	**35%**	**31%**	**37%**

Figure 6.10 U.S. SWM Export Growth, 1995-1999

	1995	1996	1997	1998	1999
US Total Exports	-	6%	9%	-14%	19%
Non-Asian	-	4%	23%	-2%	5%
To Asia	-	8%	-2%	-25%	36%
To US AEP Countries	**-**	**5%**	**3%**	**-25%**	**43%**

Figure 6.11 U.S. SWM Exports to Asia and the World

DESTINATION	1995	1996	1997	1998	1999	Total 1995-99
World	5,497,351	5,846,800	6,366,980	5,486,942	6,536,248	29,734,321
Japan	829,319	956,828	847,053	613,815	760,923	4,007,938
Taiwan	424,561	519,522	782,072	702,057	1,193,218	3,621,431
Korea	959,832	953,668	590,930	274,307	621,376	3,400,113
Singapore	208,672	258,203	313,356	294,394	330,587	1,405,212
China	176,309	183,717	173,246	137,515	158,343	829,131
Malaysia	154,831	129,598	173,292	129,902	84,154	671,776
Philippines	99,422	55,514	112,288	126,630	54,386	448,240
HK	68,849	76,781	87,578	74,178	63,241	370,627
Thailand	75,681	80,258	71,070	29,154	32,321	288,485
Indonesia	33,138	50,116	91,806	29,177	14,360	218,597
India	36,755	48,591	20,877	25,882	18,521	150,625
Vietnam	4,249	6,803	2,115	7,341	2,809	23,317
Sri Lanka	662	348	2,224	494	772	4,500

All values in thousands (000's) of US dollars

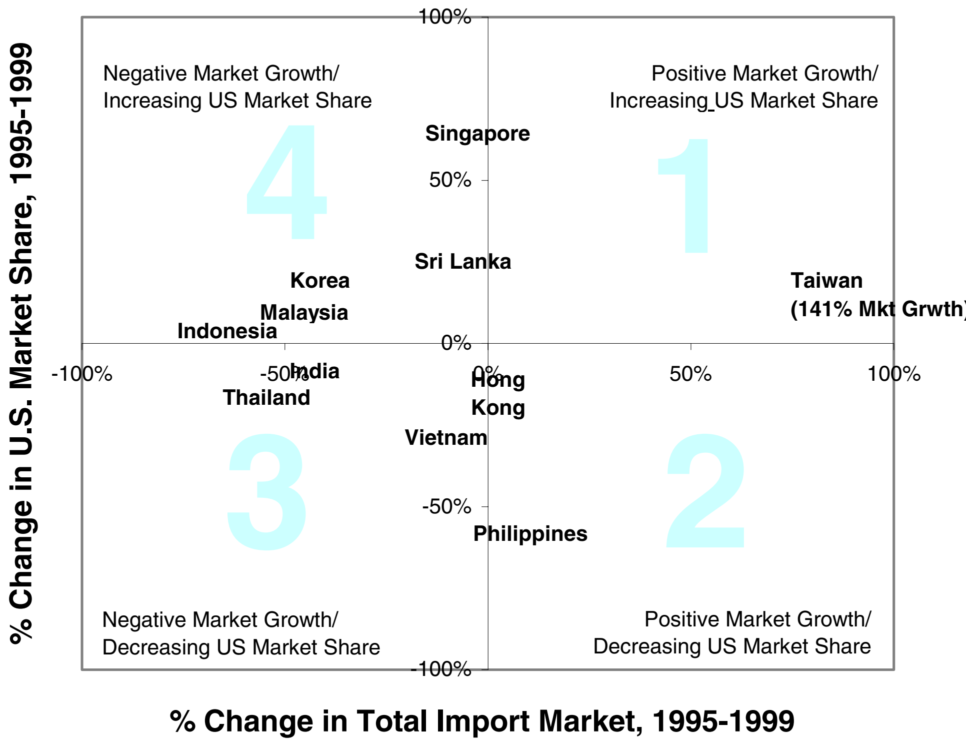
6.7 Priority Markets for U.S. Vendors and Priority Markets for US-AEP Assistance

SWM export markets across US-AEP countries contracted more often than they expanded between 1995 and 1999. Figures 6.12 and 6.13 below show two key parameters for each US-AEP country: 1) Percent growth (or decline) of total SWM exports to that country, and 2) Percent growth (or decline) of U.S. market share of those exports. For each country, the growth of overall imports is plotted against changes in U.S. market share. This shows how U.S. market share increased or decreased within the context of increasing or decreasing overall SWM import market size for each US-AEP country. The horizontal axis shows the percent change in overall SWM market size for each country. The vertical axis shows the percent change in U.S. market share. All data cover the years 1995 through 1999.

Figure 6.12 SWM Import Market Growth and U.S. Market Share Growth, 1995-1999

	Percent Change in Total SWM Import Market (1995 vs 1999)	Percent Change in U.S. SWM Market Share (1995 vs 1999)
Hong Kong	4%	-12%
India	-45%	-8%
Indonesia	-58%	4%
Korea	-44%	15%
Malaysia	-49%	6%
Philippines	22%	-55%
Singapore	-1%	60%
Sri Lanka	-3%	20%
Taiwan	141%	17%
Thailand	-50%	-14%
Vietnam	-12%	-25%

Figure 6.13 SWM Import Market Growth vs. U.S. Market Share, 1995-1999



Countries in Quadrant 1 (upper right), including only Taiwan, show that overall exports of SWM equipment to those countries increased while U.S. market share of those exports increased as well. The U.S. did relatively well in maintaining or improving it's position in those countries. Countries in Quadrant 2 (lower right), including Hong Kong and Philippines, represent growing export markets but the U.S. market share of those growing opportunities has declined. This indicates that U.S. competitive position is slipping in those countries. Countries in Quadrant 3 (lower left), including Thailand, India and Vietnam, show an overall SWM export market in decline accompanied by a loss of U.S. market share. Quadrant 4 (upper left), including Korea, Malaysia, Indonesia, Sri Lanka and Singapore, show countries where the overall SWM export market is declining but the U.S. is nonetheless gaining ground.

Overall, U.S. market share performance was fairly evenly split across the US-AEP economies. The U.S. made its greatest competitive gain (60%) in Singapore where the size of overall SWM import market held steady between 1995 and 1999. Singapore is also the market where the U.S. enjoys its greatest market share. The U.S. suffered its largest decline in the Philippines where the import market actually grew at the greatest rate among all the US-AEP countries. In the largest markets (Korea and Taiwan), the U.S. saw market share improvements of 15% and 17% respectively on top of the already strong U.S. position in both those economies.

6.8 US and Competitors Market Share Positions in US-AEP Markets

Relative market share based on the cumulative export value for years 1995 through 1999 by the US and its competitors in US-AEP countries are shown below in Figure 6.14. Trends within those countries for the US and its competitors in terms of export value to US-AEP countries in 1999 are shown in Figures 6.15 and 6.16. Japan leads in every US-AEP market except for India. India is the most competitive market with no one garnering more than 18% of the market share. The honors go to the Italians narrowly beating the Koreans and Japanese. Germany follows close behind and the US pulls in fourth. The US makes a strong second place finish in Korea, Malaysia, Philippines, Singapore and Taiwan.

Figure 6.14 U.S. and Competitors SWM Market Share for 1995-1999 (cumulative)

Country	Worldwide	Hong Kong	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thai-land	Taiwan	Vietnam	Total US-AEP Countries
Japan	26%	34%	42%	17%	53%	30%	52%	53%	43%	59%	51%	28%	48%
US	24%	12%	13%	11%	35%	9%	21%	25%	35%	10%	35%	7%	28%
Germany	16%	7%	8%	14%	6%	10%	6%	3%	5%	7%	7%	6%	6%
Italy	11%	7%	16%	18%	3%	10%	6%	5%	3%	8%	2%	16%	5%
UK	7%	8%	4%	7%	1%	14%	4%	2%	2%	2%	1%	1%	2%
France	3%	2%	1%	4%	1%	1%	1%	1%	1%	3%	1%	4%	1%
Korea	2%	4%	4%	17%	0%	4%	4%	6%	1%	3%	1%	11%	2%
Netherlands	2%	1%	1%	1%	0%	0%	1%	0%	1%	0%	0%	0%	0%
Sweden	2%	1%	1%	2%	0%	1%	1%	0%	1%	0%	0%	0%	0%
Canada	2%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Austria	2%	0%	1%	1%	0%	1%	0%	0%	1%	0%	1%	0%	0%
Taiwan	1%	20%	4%	1%	0%	9%	4%	3%	1%	3%	0%	12%	3%
China	1%	5%	3%	1%	0%	3%	1%	1%	1%	1%	0%	11%	1%
Denmark	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Australia	1%	0%	3%	4%	0%	7%	1%	1%	5%	1%	0%	3%	1%
Grand Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Total Mkt Value	126,134	3,190	1,738	1,327	9,778	51	3,180	1,778	3,981	2,763	10,210	347	38,341

All values in millions (000,000's) of US dollars

Figures 6.15 and 6.16 (Advanced Developing Countries and Less Developed Countries, respectively) reveal trends within the US-AEP countries by the US and its top competitors in the region. Comparing US market share figures for 1995 and 1999, the US has maintained or increased market share in Korea, Malaysia, Singapore, Taiwan, Indonesia, and Sri Lanka. Japan has captured more than 50% of the market share in six US-AEP countries, including a 75% share of the Thai market in 1999. Only in Singapore has Japan shown any noticeable softening in its market share.

Figure 6.15 SWM Market Share Trends by year, 1995-1999 - ADCs (Advanced Developing Countries)

Country	JPN	US	GER	ITA	TWN	UK	KOR	FRA	AUT	CHN
HK 95	36%	11%	7%	8%	19%	6%	4%	2%	1%	4%
HK 96	28%	12%	6%	7%	26%	6%	5%	2%	0%	6%
HK 97	32%	13%	8%	6%	15%	10%	4%	3%	0%	6%
HK 98	33%	13%	9%	5%	17%	9%	5%	3%	0%	5%
HK 99	38%	10%	7%	6%	22%	7%	4%	2%	0%	5%
KOR 95	52%	35%	6%	4%	0%	1%	0%	1%	0%	0%
KOR 96	53%	34%	6%	3%	1%	1%	0%	1%	0%	0%
KOR 97	59%	29%	4%	4%	0%	1%	0%	1%	0%	0%
KOR 98	44%	41%	9%	3%	0%	1%	0%	1%	0%	0%
KOR 99	52%	40%	4%	1%	0%	0%	0%	0%	0%	0%
MYS 95	61%	17%	5%	5%	4%	3%	2%	1%	1%	1%
MYS 96	47%	20%	7%	8%	4%	4%	5%	1%	1%	1%
MYS 97	45%	25%	6%	7%	3%	5%	3%	1%	2%	1%
MYS 98	46%	29%	7%	3%	3%	3%	3%	1%	1%	1%
MYS 99	53%	18%	6%	4%	3%	3%	8%	1%	3%	0%
SGP 95	55%	26%	5%	4%	2%	2%	1%	1%	1%	1%
SGP 96	44%	34%	6%	4%	1%	2%	3%	1%	2%	1%
SGP 97	44%	37%	7%	3%	1%	3%	1%	1%	2%	1%
SGP 98	32%	37%	4%	2%	1%	1%	1%	0%	18%	0%
SGP 99	38%	42%	5%	2%	1%	2%	2%	0%	1%	0%
TWN 95	56%	31%	4%	3%	0%	2%	0%	1%	0%	0%
TWN 96	52%	34%	5%	3%	0%	2%	0%	1%	0%	0%
TWN 97	46%	41%	7%	2%	0%	1%	1%	1%	0%	0%
TWN 98	51%	34%	7%	2%	0%	2%	1%	1%	0%	0%
TWN 99	52%	36%	8%	1%	0%	1%	1%	0%	0%	0%

In 1999, 89% of US export value to US-AEP countries went to 3 countries: Taiwan (49%), Korea (26%) and Singapore (14%).

Hong Kong: Japan and Taiwan control 60% of the market. US, Germans, Italians and UK battle in the second tier.

Korea – Second largest market of the US-AEP countries. From 1998 to 1999 export value to Korea grew by a factor of 2.3.($668m to $1.53b) US export value increased by a factor of 2.27; Japan's by 2.72.

Taiwan: The only AEP country to show increases every year. The largest export market @ $3.35b in 1999. This is more than twice the size of the Korean market.

Figure 6.16 SWM Market Share Trends by year, 1995-1999 – LDCs (Less Developed Countries)

Country	JPN	US	GER	ITA	TWN	UK	KOR	FRA	AUT	CHN
IND 95	17%	13%	17%	15%	2%	7%	3%	6%	10%	2%
IND 96	11%	11%	9%	17%	1%	6%	36%	3%	2%	0%
IND 97	13%	9%	15%	17%	1%	6%	14%	3%	1%	1%
IND 98	24%	12%	14%	24%	1%	8%	7%	3%	3%	0%
IND 99	24%	12%	16%	21%	1%	8%	4%	5%	2%	3%
IDN 95	45%	8%	7%	17%	4%	5%	4%	2%	3%	3%
IDN 96	38%	10%	7%	21%	3%	6%	3%	1%	3%	5%
IDN 97	38%	19%	7%	18%	5%	1%	4%	1%	3%	2%
IDN 98	51%	17%	9%	3%	3%	1%	4%	1%	8%	1%
IDN 99	52%	9%	10%	5%	3%	7%	6%	0%	2%	1%
PHL 95	45%	32%	5%	7%	2%	2%	4%	1%	1%	0%
PHL 96	59%	16%	2%	11%	3%	1%	4%	1%	1%	1%
PHL 97	49%	27%	3%	5%	3%	2%	7%	1%	1%	1%
PHL 98	46%	38%	3%	2%	3%	2%	4%	0%	1%	0%
PHL 99	67%	14%	2%	2%	2%	2%	9%	1%	1%	0%
LKA 95	37%	7%	7%	12%	11%	9%	5%	1%	3%	5%
LKA 96	28%	4%	8%	14%	13%	19%	3%	0%	6%	2%
LKA 97	31%	18%	6%	12%	6%	15%	4%	1%	3%	2%
LKA 98	33%	5%	15%	6%	11%	9%	7%	1%	9%	2%
LKA 99	22%	9%	17%	6%	4%	19%	3%	1%	13%	2%
THA 95	58%	10%	6%	11%	3%	2%	1%	4%	1%	1%
THA 96	54%	12%	6%	11%	4%	3%	4%	2%	2%	1%
THA 97	57%	11%	12%	7%	2%	3%	4%	3%	1%	1%
THA 98	60%	9%	9%	3%	4%	1%	4%	6%	1%	1%
THA 99	75%	9%	3%	2%	3%	1%	5%	0%	1%	1%
VNM 95	11%	7%	6%	24%	9%	2%	22%	3%	3%	12%
VNM 96	28%	7%	4%	13%	17%	2%	11%	5%	4%	7%
VNM 97	39%	3%	4%	12%	7%	2%	6%	2%	1%	21%
VNM 98	30%	11%	4%	18%	15%	0%	7%	3%	4%	6%
VNM 99	28%	5%	12%	16%	10%	0%	12%	5%	1%	9%

All LDC markets contracted in 1999 except for Philippines and Thailand.

US export value to LDC markets contracted by 44% from 1998 to 1999. Japan's export value to LDC markets increased by 29%.

Indonesia – From 1994, to 1997, the Italians had a strong hold on 2nd place for market share. US had it in 1998 and then lost it to the Germans in 1999. While the US lost more than50% of it's export value from 1998 to 1999, Germany, Italy, UK, Sweden, Korea, Austria and China all reported increases.

Philippines: US market share fell by 63%; export value by 57%. Japan's market share increased by 30%; export value increased by 62%.

6.9 SWM Country Summaries

Total Import Market Size

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	3,190,111	1,738,076	1,326,892	9,777,938	51,257	3,179,703	1,777,540	3,980,950	2,762,867	10,209,512	346,530	38,341,375
1995	629,272	404,052	291,969	2,730,025	9,225	907,588	310,132	789,747	731,286	1,389,994	60,867	8,254,156
1999	653,653	168,332	159,188	1,534,686	8,941	463,996	378,730	782,625	362,217	3,351,765	53,460	7,917,592

Total Import Market Growth

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
$	24,381	(235,720)	(132,781)	(1,195,339)	(285)	(443,592)	68,598	(7,122)	(369,069)	1,961,771	(7,408)	(336,565)
%	4%	-58%	-45%	-44%	-3%	-49%	22%	-1%	-50%	141%	-12%	-4%

Rank by Size Among US-AEP Countries

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam
1995-1999	4	8	9	2	11	5	7	3	6	1	10
1995	6	7	9	1	11	3	8	4	5	2	10
1999	4	8	9	2	11	5	6	3	7	1	10

US Export Value

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	370,627	218,597	150,625	3,400,113	4,500	671,776	448,240	1,405,212	288,485	3,621,431	23,317	10,602,923
1995	68,849	33,138	36,755	959,832	662	154,831	99,422	208,672	75,681	424,561	4,249	2,066,652
1999	63,241	14,360	18,521	621,376	772	84,154	54,386	330,587	32,321	1,193,218	2,809	2,415,745

ExportGrowth1995–1999

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
$	(5,608)	(18,778)	(18,234)	(338,457)	110	(70,677)	(45,036)	121,915	(43,360)	768,657	(1,440)	349,093
%	-8%	-57%	-50%	-35%	17%	-46%	-45%	58%	-57%	181%	-34%	17%

US Market Share

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	12%	13%	11%	35%	9%	21%	25%	35%	10%	35%	7%	28%
1995	11%	8%	13%	35%	7%	17%	32%	26%	10%	31%	7%	25%
1999	10%	9%	12%	40%	9%	18%	14%	42%	9%	36%	5%	31%

US Marke tShare Rank

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	3	3	5	2	6	2	2	2	2	2	6	2
1995	3	3	4	2	5	2	2	2	3	2	6	2
1999	3	3	4	2	5	2	2	1	2	2	7	2

Market Share Leader

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	Japan	Japan	Italy	Japan	Japan	Japan	Japan	Japan	Japan	Japan	Japan	Japan
1995	Japan	Japan	Japan	Japan	Japan	Japan	Japan	Japan	Japan	Japan	Italy	Japan
1999	Japan	Japan	Japan	Japan	Japan	Japan	Japan	US	Japan	Japan	Japan	Japan

US-AEP

United States–Asia
Environmental Partnership

U.S. Environmental Industry Export Competitiveness

Chapter 7. Wastewater Management Equipment

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7.1 Executive Summary

The objective of this report is to evaluate U.S. environmental industry competitiveness specifically in the market sector Wastewater Management (WWM) Equipment. The results of this analysis will highlight areas of relative strength and weakness of U.S. WWM equipment exports globally and within the US-AEP countries. These results are to help guide the efforts and attentions of both U.S. private industry and US-AEP.

U.S. companies accounted for approximately 25% of the total value of environmental exports worldwide in 1999. In the same year, German and Japanese competitors captured market shares of 19% and 15% respectively. In the sector of Wastewater Management (WWM) Equipment, the U.S. is the second largest exporter behind Germany. Between 1995 and 1999, Germany achieved a cumulative market share of 26% while the U.S. trailed distantly at 18%. Japan followed at 11%. However, during the same period, U.S. market share was increasing while German (and Japanese) market share was falling.

Among the US-AEP countries specifically, German WWM equipment suppliers are ranked third while Japan is the market leader with a 34% share. The U.S., still in second place, held an average market share of 16% during the 1995-1999 period. But again, the U.S. saw market share growing during the period while the market leader (now Japan) saw its position slip.

Within the individual US-AEP countries, U.S. WWM equipment export competitiveness has been largely positive despite overall WWM equipment import markets that were almost uniformly declining. The most notable exception is Vietnam where overall WWM equipment import markets actually grew significantly between 1995 and 1999 but U.S. market share fell slightly over the same period. U.S. position also slipped in the Philippines, which was an import market in decline along with most of the markets in the region.

7.2 The U.S. Follows Germany in Global Wastewater Management Equipment Trade

Figure 7.1 shows global WWM equipment exports ranked by country of origin according to cumulative exports from 1995 to 1999. Over the five-year period, the total WWM equipment export market was approximately $63 billion. Between 1995 and 1999, Germany was consistently the leading worldwide exporter of WWM equipment with a cumulative total of approximately $16.1 billion of exports. Over the same period, the U.S. followed with a cumulative total of approximately $11.3 billion, followed by Japan, France and Italy at $7.2 billion, $5.6 billion and $5.4 billion respectively. Japan, France and Italy sometimes traded ranks depending on the specific year. In 1999 alone, global exports of WWM equipment totaled $12.8 billion. In the same year, Germany and the U.S. saw global WWM equipment exports of approximately $3.2 billion and $2.4 billion respectively.

Figure 7.1 Global WWM Export Value by Major Country of Origin by, 1995-1999

COUNTRY OF ORIGIN	Total 95	Total 96	Total 97	Total 98	Total 99	Total 1995-99
Germany	3,238,646	3,138,679	3,155,921	3,382,236	3,221,845	16,137,328
US	1,889,876	2,182,453	2,428,589	2,443,870	2,391,717	11,336,504
Japan	1,721,704	1,535,833	1,441,781	1,244,589	1,257,150	7,201,058
France	945,082	994,378	1,029,589	1,292,397	1,317,496	5,578,941
Italy	905,771	1,092,406	1,051,634	1,151,986	1,150,077	5,351,874
UK	752,210	814,909	874,525	868,289	849,886	4,159,819
Netherlands	501,169	484,222	456,617	455,772	486,957	2,384,738
Sweden	451,916	477,358	403,788	396,416	395,402	2,124,881
Korea	336,299	404,333	434,390	356,268	362,770	1,894,060
Denmark	289,989	324,103	303,361	313,532	331,874	1,562,859
Canada	207,682	269,472	302,739	351,317	377,642	1,508,851
Taiwan	290,857	292,520	247,541	232,600	236,941	1,300,459
China	232,832	283,684	275,151	230,745	263,882	1,286,294
Austria	158,707	202,431	108,123	135,437	151,725	756,424
Australia	36,820	63,445	41,649	42,412	50,752	235,078
Grand Total	11,959,560	12,560,225	12,555,400	12,897,866	12,846,115	62,819,166

All values in thousands (000's) of US dollars

Figure 7.2 shows global WWM equipment export market shares from 1995 to 1999. During the period, Germany's cumulative exports represented 26% of the total market, followed by the U.S. at 18% and Japan at 11%. France and Italy shared fourth place each with an approximately 9% share. While German market share held fairly steady during the period, the U.S. enjoyed an increase from 16% to 19%. France and Italy also enjoyed gains. Japan, on the other hand, saw market share decrease from 14% to 10% between 1995 and 1999.

Figure 7.2 Global WWM Export Market Share by Major Country of Origin, 1995-1999

COUNTRY OF ORIGIN	Total 95	Total 96	Total 97	Total 98	Total 99	Total 1995-99
Germany	27%	25%	25%	26%	25%	26%
US	16%	17%	19%	19%	19%	18%
Japan	14%	12%	11%	10%	10%	11%
France	8%	8%	8%	10%	10%	9%
Italy	8%	9%	8%	9%	9%	9%
UK	6%	6%	7%	7%	7%	7%
Netherlands	4%	4%	4%	4%	4%	4%
Sweden	4%	4%	3%	3%	3%	3%
Korea	3%	3%	3%	3%	3%	3%
Denmark	2%	3%	2%	2%	3%	2%
Canada	2%	2%	2%	3%	3%	2%
Taiwan	2%	2%	2%	2%	2%	2%
China	2%	2%	2%	2%	2%	2%
Austria	1%	2%	1%	1%	1%	1%
Australia	0%	1%	0%	0%	0%	0%
Grand Total	100%	100%	100%	100%	100%	100%

7.3 Japan and the U.S. Share the Lead in WWM Equipment Exports to US-AEP Counties

Figure 7.3 shows WWM equipment exports to US-AEP countries ranked by country of origin according to cumulative exports from 1995 to 1999. Over the five-year period, the total US-AEP WWM equipment export market was approximately $10.8 billion. Japan was the dominant exporter (in terms of total dollar value) with approximately $3.7 billion of total WWM Equipment export value. The U.S. followed distantly in second place with approximately $1.7 billion in exports. Germany, the global market leader, held third place with approximately $1.4 billion. Korea was the next strongest exporter to the region with approximately $1.1 billion in exports. Italy, which is strong in global markets, fell to the ninth position in Asia.

Figure 7.3 WWM Equipment Export Value by Major Country of Origin Across All US-AEP Countries, 1995-1999

COUNTRY OF ORIGIN	95	96	97	98	99	Total 1995-99
Japan	958,525	856,435	792,660	561,811	514,769	3,684,200
US	**323,964**	**404,897**	**403,269**	**300,644**	**276,603**	**1,709,377**
Germany	293,010	338,700	305,835	217,589	196,146	1,351,281
Korea	195,112	261,318	275,800	197,404	185,213	1,114,847
Taiwan	213,959	216,781	181,950	155,720	144,193	912,603
UK	116,544	109,931	117,688	92,857	85,839	522,859
China	59,740	65,914	75,665	60,643	66,596	328,559
France	62,102	55,584	55,411	50,571	50,470	274,138
Italy	39,298	63,087	42,534	51,035	31,083	227,038
Netherlands	51,361	56,904	36,088	35,387	27,147	206,888
Sweden	35,473	39,991	35,744	19,504	18,695	149,407
Australia	12,765	22,005	16,327	11,625	16,817	79,539
Austria	11,496	15,597	7,356	11,387	28,372	74,208
Canada	9,308	18,377	19,194	13,369	3,959	64,208
Denmark	13,544	13,621	11,719	11,367	8,785	59,037
Total To US-AEP Countries	2,396,202	2,539,141	2,377,242	1,790,913	1,654,689	10,758,186

All values in thousands (000's) of US dollars

Figure 7.4 shows the total values converted to WWM Equipment export market shares among US-AEP countries, again ranked by cumulative 1995-99 market share. Over the five-year period, Japan led with a cumulative 34% share, followed by the U.S. at 16% and Germany and Korea at 13% and 10% respectively. Although the U.S. position has been weak relative to the Japanese, the U.S. share grew substantially from 14% to 17% between 1995 and 1999. Korea also saw an improvement in market share. Most remarkable, however, is that the market leader, Japan, saw a precipitous decline in market share from 40% in 1995 to 31% in 1999. Other exporters held roughly steady throughout the period.

Figure 7.4 WWM Equipment Export Market Share by Major Country of Origin Across All US-AEP Countries, 1995-1999

COUNTRY OF ORIGIN	95	96	97	98	99	Total 1995-99
Japan	40%	34%	33%	31%	31%	34%
US	**14%**	**16%**	**17%**	**17%**	**17%**	**16%**
Germany	12%	13%	13%	12%	12%	13%
Korea	8%	10%	12%	11%	11%	10%
Taiwan	9%	9%	8%	9%	9%	8%
UK	5%	4%	5%	5%	5%	5%
China	2%	3%	3%	3%	4%	3%
France	3%	2%	2%	3%	3%	3%
Italy	2%	2%	2%	3%	2%	2%
Netherlands	2%	2%	2%	2%	2%	2%
Sweden	1%	2%	2%	1%	1%	1%
Australia	1%	1%	1%	1%	1%	1%
Austria	0%	1%	0%	1%	2%	1%
Canada	0%	1%	1%	1%	0%	1%
Denmark	1%	1%	0%	1%	1%	1%
Total To US-AEP Countries	100%	100%	100%	100%	100%	100%

7.4 Another Opinion on U.S. Competitiveness in Asia

The OECD/ETI data shows that the U.S. is a dominant player in global environmental markets in general and is competitive (and increasingly so) in global and Asian WWM equipment markets more specifically.

Environmental Business International shed some light on how U.S. firms stack up against Japanese, German, French and U.K. competitors in WWM equipment export markets. EBI defines and tracks an environmental industry segment titled Water Equipment and Chemicals, which closely parallels the exports tracked by the OECD/ETI WWM equipment sector.

EBI rated several countries' ability to compete in each of these environmental market segments. As shown in Figure 7.5, the U.S. and Germany are rated "G" or good in this segment. Japan, France and U.K. earned a rating of "GE" or good to excellent. The OECD/ETI data seems to present an inverse perspective by revealing Germany and, to a lesser degree, the U.S., as the global export leaders while Japan, France and U.K. trail behind.

Figure 7.5 Relative Competitiveness of Environmental Industries

Equipment	**US**	**Germ**	**Japan**	**F&UK**	**Dev'g**
Water Equipment & Chemicals	G	G	GE	GE	MP
Air Pollution Control	OG	E	E	O	MP
Instruments & Info. Systems	E	G	G	O	P
Waste Mgmt Equipment	G	GE	OG	O	OM
Process & Prevention Tech.	P	P	M	P	P
Services					
Solid Waste Management	G	OG	OM	EG	MP
Hazardous Waste Mgmt	G	O	O	OG	P
Consulting & Engineering	GE	OG	M	OG	MP
Remediation/Industrial Svcs.	G	O	M	OM	P
Analytical Services	G	O	O	O	MP
Water Treatment Works	MP	M	MP	GE	MP
Resources					
Water Utilities	MP	MP	P	GE	MP
Resource Recovery	O	OG	O	O	MP
Environmental Energy	OG	OG	OG	OG	P
Rating	111	105	93	111	47

Source: Environmental Business International, Inc., San Diego,, E-excellent, G-good, O-OK, M-mediocre, P-poor
Based on ratings of technology, commercial orientation, management, finance, global presence, govt support,etc

7.5 Asia Regional WWM Equipment Trade by Commodity

Within the WWM equipment segment, there are eight main categories of commodity exports that are tracked in the OECD/ETI data.[2]

HS	**HS Description**
392690	articles of plastics or of other materials of Nos 39.01 to 39.14 nes
460120	Mats, matting and screens of vegetable plaiting materials
560300	Nonwovens, whether or not impregnated, coated, covered or laminated
841360	Rotary positive displacement pumps nes
841370	Centrifugal pumps nes
842121	Filtering or purifying machinery and apparatus for water
842129	Filtering or purifying machinery and apparatus for liquids nes
847982	Mach f mixing/kneading/crushing/grindg etc nes havg individ function

Many countries do not collect export data at greater than the 6-digit HS level or track the ultimate application of such equipment, so it is not possible to fully decompose these figures in order to identify strictly environmental uses. Nevertheless, we believe that these figures are

[2] For the purpose of this analysis, HS category 392690 (articles of plastics or of other materials of Nos 39.01 to 39.14 nes) was excluded from the data set because it contains a large number of commodities that are not strictly environmental in nature.

sufficiently robust that they provide a reasonably accurate picture of trade activity, particularly when the data are analyzed from a market share or time series perspective rather than in terms of absolute dollar value.

The top five WWM equipment categories represent the vast majority of exports in this segment and are shown below according to 1999 export values by each major exporter.

Figure 7.6 Export Values to US-AEP Countries by WWM Equipment Commodity in 1999

COUNTRY OF ORIGIN	560300 Nonwovens, whether or not impregnated, coated, covered or laminated	841370 Centrifugal pumps nes	842121 Filtering or purifying machinery and apparatus for water	841360 Rotary positive displacement pumps nes	842129 Filtering or purifying machinery and apparatus for liquids nes	Total WWM
Japan	166,180	134,041	46,444	82,685	45,767	514,769
Taiwan	112,221	3,091	9,257	1,737	1,705	**276,603**
US	41,635	66,221	113,547	13,833	31,728	196,146
China	37,535	9,760	3,433	2,146	2,501	185,213
Korea	158,712	7,433	14,823	95	1,686	144,193
Germany	41,573	52,231	25,532	27,957	18,444	85,839
UK	9,971	40,775	20,680	5,088	3,363	66,596
France	3,059	13,109	16,833	798	8,967	50,470
Italy	8,354	9,765	5,324	2,510	2,702	31,083
Netherlands	9,821	5,786	4,098	1,488	4,084	27,147
Austria	-	4,682	22,257	513	848	18,695
Sweden	352	8,417	4,747	3,066	1,680	16,817
Australia	3,643	948	6,937	210	3,153	28,372
Denmark	1,331	4,905	602	-	1,172	3,959
Canada	60	850	1,968	211	257	8,785
Grand Total	594,447	362,012	296,482	142,335	128,056	1,654,689

All values in thousands (000's) of US dollars

Figure 7.7 shows US-AEP export market share according to major country of origin and WWM commodity. Consistent with it's overall dominance in the sector and the region, Japan leads in four of the top five commodity categories. However, in the largest single category (560300), the market share of Korean exports is only slightly behind that of Japan. If Korean exports were not so relatively weak in the remaining categories, Korea would have a much stronger overall position in the region. In sum, competitiveness among exporters is very dependent on the specific type of commodity in question.

Figure 7.7 Major Country of Origin Market Share by WWM Equipment Commodity in 1999

COUNTRY OF ORIGIN	560300 Nonwovens, whether or not impregnated, coated, covered or laminated	841370 Centrifugal pumps nes	842121 Filtering or purifying machinery and apparatus for water	841360 Rotary positive displacement pumps nes	842129 Filtering or purifying machinery and apparatus for liquids nes	Total WWM
Japan	28%	37%	16%	58%	36%	31%
Taiwan	19%	1%	3%	1%	1%	17%
US	7%	18%	38%	10%	25%	12%
China	6%	3%	1%	2%	2%	11%
Korea	27%	2%	5%	0%	1%	9%
Germany	7%	14%	9%	20%	14%	5%
UK	2%	11%	7%	4%	3%	4%
France	1%	4%	6%	1%	7%	3%
Italy	1%	3%	2%	2%	2%	2%
Netherlands	2%	2%	1%	1%	3%	2%
Austria	-	1%	8%	0%	1%	1%
Sweden	0%	2%	2%	2%	1%	1%
Australia	1%	0%	2%	0%	2%	2%
Denmark	0%	1%	0%	-	1%	0%
Canada	0%	0%	1%	0%	0%	1%
Percent of Total WWM	36%	22%	18%	9%	8%	100%

7.6 United States Export Performance

This section looks briefly but specifically at U.S. WWM equipment export performance in the world, in Asia and among the US-AEP countries. U.S. WWM equipment exports to Asia represented 20% of total U.S. WWM equipment exports in 1999. The number is 12% when looking at US-AEP countries alone. Exports to countries outside of Asia accounted for 80% of U.S. WWM equipment exports in the same year.

When we look at export trends over time, we see that Asia and the US-AEP countries have represented an unevenly declining share of total U.S. WWM equipment exports between 1995 and 1999. In 1996, U.S. WWM equipment export growth to Asia and the US-AEP countries increased significantly before beginning to decline for the next three years. This observation is certainly consistent with the challenge that the Asian economic crisis has presented to U.S. export industries overall and we would expect to see the negative trend reverse as the regional economic recovery continues. But, as revealed by the analysis above in Section 6, it is also important to note that during the period the U.S. actually saw its market share increase relative to Japanese and other competitors whose share was either flat or significantly declining (i.e. Japan).

Figure 7.8 U.S. WWM Equipment Export Value, 1995-1999

	1995	1996	1997	1998	1999
US Total Exports	1,889,876	2,182,453	2,428,589	2,443,870	2,391,717
Non- Asian	1,420,875	1,531,615	1,803,296	1,910,216	1,921,986
To Asia	469,001	650,838	625,293	533,654	469,730
To US AEP Countries	**323,964**	**404,897**	**403,269**	**300,644**	**276,603**

All values in thousands (000's) of US dollars

Figure 7.9 U.S. WWM Equipment Export Market Share, 1995-1999

	1995	1996	1997	1998	1999
US Total Exports	100%	100%	100%	100%	100%
Non-Asian	75%	70%	74%	78%	80%
To Asia	25%	30%	26%	22%	20%
To US AEP Countries	**17%**	**19%**	**17%**	**12%**	**12%**

Figure 7.10 U.S. WWM Equipment Export Growth, 1995-1999

	1995	1996	1997	1998	1999
US Total Exports	-	15%	11%	1%	-2%
Non-Asian	-	8%	18%	6%	1%
To Asia	-	39%	-4%	-15%	-12%
To US AEP Countries	**-**	**25%**	**0%**	**-25%**	**-8%**

Figure 7.11 U.S. WWM Equipment Exports to Asia and the World

DESTINATION	1995	1996	1997	1998	1999	Total 1995-99
World	1,889,876	2,182,453	2,428,589	2,443,870	2,391,717	11,336,504
Japan	98,270	198,791	173,846	180,131	141,527	792,565
Korea	110,484	114,033	90,317	37,175	65,370	417,379
Taiwan	56,664	68,383	83,751	102,512	70,083	381,393
China	46,767	47,151	48,178	52,878	51,600	246,573
HK	40,885	54,198	49,326	42,158	33,684	220,251
Singapore	35,948	41,234	49,337	37,485	33,487	197,490
Thailand	26,227	38,573	45,756	22,613	18,131	151,299
Malaysia	14,208	28,796	34,880	12,657	18,648	109,189
Philippines	14,361	22,822	26,037	14,884	10,808	88,911
India	13,229	13,463	10,331	20,685	16,580	74,288
Indonesia	10,249	19,757	12,060	7,183	7,628	56,878
Vietnam	1,000	3,026	1,262	2,699	1,267	9,253
Sri Lanka	710	613	213	593	916	3,045

All values in thousands (000's) of US dollars

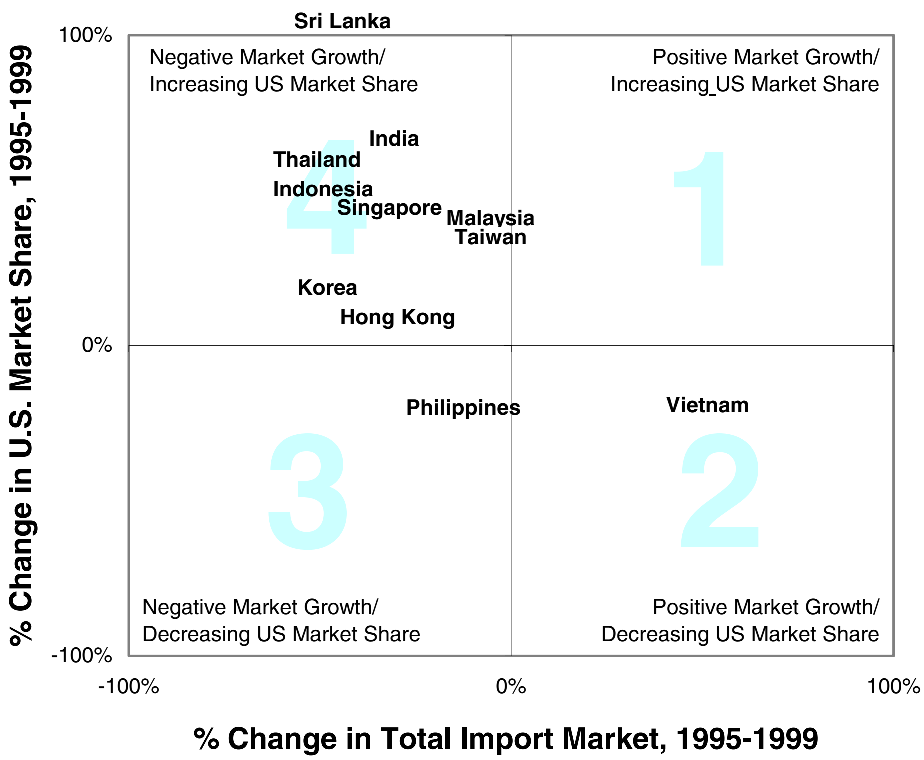
7.7 Priority Markets for U.S. Vendors and Priority Markets for US-AEP Assistance

WWM equipment export markets across US-AEP countries contracted much more often than they expanded between 1995 and 1999. Figures 7.12 and 7.13 below show two parameters for each US-AEP country: 1) Percent growth (or decline) of total WWM equipment exports to that country, and 2) Percent growth (or decline) of U.S. market share of those exports. For each country, the growth of overall imports is plotted against changes in U.S. market share. This shows how U.S. market share increased or decreased within the context of increasing or decreasing overall WWM equipment import market size for each US-AEP country. The horizontal axis shows the percent change in overall WWM equipment market size for each country. The vertical axis shows the percent change in U.S. market share. All data cover the years 1995 through 1999.

Figure 7.12 WWM Equipment Import Market Growth and U.S. Market Share Growth, 1995-1999

	Percent Change in Total WWM Import Market (1995 vs 1999)	Percent Change in U.S. WWM Market Share (1995 vs 1999)
Hong Kong	-24%	8%
India	-24%	66%
Indonesia	-49%	45%
Korea	-49%	15%
Malaysia	-4%	37%
Philippines	-7%	-19%
Singapore	-33%	40%
Sri Lanka	-40%	114%
Taiwan	-5%	30%
Thailand	-56%	56%
Vietnam	53%	-17%

Figure 7.13 WWM Equipment Import Market Growth vs. U.S. Market Share, 1995-1999



Quadrant 1, containing no countries, would indicate a market where overall exports of WWM equipment were increasing while U.S. market share of those exports was increasing as well. This would indicate that the U.S. did relatively well in maintaining or improving it's position in those growing markets. Countries in Quadrant 2 (lower right), including only Vietnam, represent growing import markets but where the U.S. market share of those growing opportunities has declined. This indicates that U.S. competitive position is slipping somewhat in Vietnam. Countries in Quadrant 3 (lower left), including only the Philippines, show an overall WWM equipment export market in decline accompanied by a loss of U.S. market share. Quadrant 4 (upper left), including Indonesia, India, Singapore, Thailand, Taiwan, Hong Kong, Korea, Malaysia and Sri Lanka, show countries where the overall WWM import market is declining but the U.S. is nonetheless gaining ground against it's competitors.

The U.S. made its single greatest competitive gain (114%) in Sri Lanka where, unfortunately, the size of overall WWM equipment import market fell by 40% between 1995 and 1999. The next largest gains for the U.S. were in India (66%) and Thailand (56%) where, once again, overall markets suffered significant declines of –24% and –56% respectively. The U.S. suffered it's greatest single decline in competitive performance in the Philippines where, despite a market in only moderate decline of 7%, the U.S. share of that market slipped 19% between 1995 and 1999.

7.8 US and Competitors Market Share Positions in US-AEP Markets

Relative market share based on the cumulative export value for years 1995 through 1999 by the US and its competitors in US-AEP countries are shown below in Figure 7.14. Trends within those countries for the US and its competitors in terms of export value to US-AEP countries in 1999 are shown in Figures 7.15 and 7.16. Japan leads in every US-AEP market except for Sri Lanka and Vietnam. India. The US shows the most strength in the Philippines, Singapore, and Taiwan. During this five-year period, India has been the most competitive market with no one garnering more than 22% of the market share. The Japanese hold a slim lead over the Germans and the Americans and British are tied for third place. This market has been shifting as revealed in Figure 7.16. The Koreans show significant strength in Indonesia and Vietnam.

Figure 7.14 U.S. and Competitors WWM Market Share, 1995-1999 (cumulative)

Country	Worldwide	Hong Kong	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thai-land	Taiwan	Vietnam	Total US-AEP Countries
Germany	26%	8%	8%	20%	15%	24%	13%	6%	15%	13%	15%	18%	13%
US	18%	10%	5%	14%	21%	4%	17%	24%	22%	14%	26%	2%	16%
Japan	11%	25%	35%	22%	47%	11%	31%	32%	32%	37%	41%	19%	34%
France	9%	1%	2%	7%	3%	5%	3%	1%	2%	3%	2%	3%	3%
Italy	9%	2%	2%	8%	1%	1%	2%	2%	2%	3%	2%	1%	2%
UK	7%	4%	2%	15%	3%	10%	7%	3%	10%	5%	4%	1%	5%
Netherlands	4%	1%	2%	5%	1%	1%	4%	1%	3%	1%	3%	0%	2%
Sweden	3%	1%	1%	1%	1%	1%	3%	1%	3%	2%	1%	0%	1%
Korea	3%	13%	33%	3%	0%	28%	9%	11%	2%	13%	2%	35%	10%
Denmark	2%	0%	0%	1%	1%	0%	0%	0%	2%	1%	0%	0%	1%
Canada	2%	0%	0%	1%	1%	0%	0%	1%	0%	0%	1%	0%	1%
Taiwan	2%	27%	5%	1%	2%	7%	6%	9%	2%	5%	0%	16%	8%
China	2%	7%	2%	1%	3%	2%	3%	2%	1%	2%	1%	3%	3%
Austria	1%	0%	1%	1%	0%	0%	1%	4%	0%	0%	1%	0%	1%
Australia	0%	1%	1%	0%	0%	5%	1%	2%	2%	0%	1%	1%	1%
Total Mkt Value	62,819	2,189	1,090	529	2,020	72	644	369	903	1,060	1,484	398	10,758

All values in millions (000,000's) of US dollars

Figures 7.15 and 7.16 (Advanced Developing Countries and Less Developed Countries, respectively) reveals trends within the US-AEP countries by the US and its top competitors in the region. Comparing US market share figures for 1995 and 1999, the US has maintained or increased market share in every US-AEP country except for the Philippines and Vietnam. Comparing Japan's market share figures for 1995 to 1999 the data show a decline in every country except for Hong Kong and Vietnam.

Figure 7.15 WWM Market Share Trends by year, 1995-1999 – ADCs (Advanced Developing Countries)

Country	JPN	US	GER	KOR	TWN	UK	CHN	FRA	ITA	NDL
HK 95	26%	9%	7%	10%	32%	5%	5%	2%	1%	1%
HK 96	24%	11%	8%	14%	29%	3%	6%	1%	2%	1%
HK 97	25%	10%	8%	14%	24%	5%	8%	1%	1%	1%
HK 98	22%	11%	8%	14%	26%	4%	10%	1%	2%	1%
HK 99	27%	9%	7%	12%	26%	4%	10%	2%	1%	1%
KOR 95	53%	20%	14%	0%	1%	3%	2%	2%	1%	1%
KOR 96	46%	21%	15%	0%	2%	3%	2%	2%	1%	1%
KOR 97	40%	20%	19%	0%	2%	4%	3%	4%	2%	1%
KOR 98	47%	17%	16%	0%	2%	3%	4%	4%	3%	1%
KOR 99	46%	24%	13%	0%	1%	2%	3%	5%	1%	1%
MYS 95	33%	12%	14%	10%	5%	6%	3%	6%	1%	6%
MYS 96	26%	20%	14%	12%	6%	5%	2%	2%	2%	5%
MYS 97	33%	22%	10%	8%	5%	5%	3%	2%	1%	4%
MYS 98	36%	12%	10%	6%	9%	9%	2%	4%	3%	5%
MYS 99	25%	16%	17%	10%	8%	10%	3%	3%	2%	3%
SGP 95	35%	18%	13%	3%	3%	12%	1%	2%	1%	3%
SGP 96	32%	20%	17%	1%	3%	9%	2%	2%	3%	5%
SGP 97	31%	25%	14%	3%	2%	9%	2%	3%	2%	3%
SGP 98	35%	24%	14%	3%	2%	8%	1%	2%	1%	2%
SGP 99	27%	25%	14%	1%	2%	13%	1%	3%	3%	3%
TWN 95	51%	20%	13%	2%	0%	2%	1%	2%	1%	4%
TWN 96	42%	25%	13%	2%	0%	3%	1%	3%	1%	7%
TWN 97	37%	29%	17%	3%	0%	5%	2%	2%	1%	1%
TWN 98	37%	30%	16%	3%	0%	3%	1%	2%	3%	1%
TWN 99	39%	25%	15%	3%	0%	6%	1%	2%	2%	2%

Highwater mark for US export value to ADCs was in 1997 @ $308m. In 1999, total export value was $221m (a 28% decline).

Korea: The largest market in 1995, now second behind Hong Kong. Despite an increase of 26% in export value from 1998 to 1999, the export value in 1999 ($277m) is only 50% of its peak in 1995 ($538m).

Taiwan and Malaysia are the only countries where US export value is higher in 1999 than in 1995.

Figure 7.16 WWM Market Share Trends by year, 1995 through 1999 - LDCs (Less Developed Countries)

Country	JPN	US	GER	KOR	TWN	UK	CHN	FRA	ITA	NDL
IND 95	27%	12%	22%	2%	1%	20%	0%	8%	3%	2%
IND 96	19%	12%	30%	2%	1%	11%	1%	6%	11%	3%
IND 97	21%	13%	23%	4%	2%	15%	1%	6%	7%	3%
IND 98	27%	14%	11%	4%	1%	15%	1%	5%	10%	9%
IND 99	13%	20%	20%	6%	2%	12%	1%	10%	7%	5%
IDN 95	40%	4%	8%	29%	6%	1%	2%	2%	1%	3%
IDN 96	34%	6%	9%	31%	5%	3%	2%	2%	3%	1%
IDN 97	42%	4%	7%	31%	4%	2%	2%	2%	2%	2%
IDN 98	27%	6%	10%	41%	5%	1%	1%	3%	1%	1%
IDN 99	23%	6%	4%	42%	5%	1%	4%	1%	1%	3%
PHL 95	41%	22%	6%	9%	9%	3%	2%	0%	2%	1%
PHL 96	34%	28%	4%	12%	8%	2%	2%	2%	3%	1%
PHL 97	33%	28%	5%	14%	8%	2%	1%	1%	3%	0%
PHL 98	24%	22%	8%	11%	10%	6%	2%	3%	2%	1%
PHL 99	27%	18%	7%	9%	8%	1%	2%	1%	2%	2%
LKA 95	20%	4%	26%	19%	4%	6%	1%	16%	1%	0%
LKA 96	7%	5%	20%	34%	4%	18%	3%	0%	1%	3%
LKA 97	7%	2%	23%	36%	6%	12%	4%	1%	1%	1%
LKA 98	6%	4%	24%	33%	9%	11%	1%	0%	2%	1%
LKA 99	8%	8%	25%	22%	12%	6%	4%	2%	1%	0%
THA 95	44%	10%	13%	11%	5%	4%	2%	2%	5%	2%
THA 96	35%	14%	15%	10%	5%	6%	2%	2%	4%	1%
THA 97	39%	17%	11%	16%	4%	4%	1%	2%	1%	1%
THA 98	30%	17%	11%	17%	5%	4%	2%	6%	3%	2%
THA 99	32%	15%	10%	15%	7%	7%	3%	4%	2%	1%
VNM 95	23%	2%	23%	20%	16%	1%	7%	5%	1%	1%
VNM 96	17%	4%	19%	35%	17%	1%	3%	2%	1%	1%
VNM 97	14%	1%	19%	40%	15%	3%	1%	3%	1%	0%
VNM 98	18%	3%	16%	38%	17%	0%	1%	2%	1%	0%
VNM 99	24%	1%	13%	38%	17%	0%	2%	2%	0%	0%

Export value in this sector to the LDCs was down 36% 1995 to 1999.

Largest LDC market in 1999: Indonesia@ $129m. Thailand came in second @ $122m.

Vietnam: Only LDC country that showed an increase in export value 1995 to 1999 – 53%. In 1999, In 1999, export value to Vietnam was more than to India, $89m to $81m.

India: US export value is 25% higher in 1999 than in 1995. Able to grab market share lead from Japan (export value down by 65%) and Germany (export value down by 31%).

7.9 WWM Country Summaries

Total Import Market Size

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	2,188,547	1,090,415	528,771	2,020,055	71,821	644,262	369,324	903,148	1,060,189	1,483,637	398,018	10,758,186
1995	467,102	250,795	107,040	538,959	19,678	121,327	65,994	202,420	274,821	289,969	58,096	2,396,202
1999	356,190	128,905	80,965	277,032	11,880	116,343	61,521	134,889	121,829	276,269	88,867	1,654,689

Total Import Market Growth

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
$	(110,912)	(121,890)	(26,075)	(261,928)	(7,798)	(4,985)	(4,473)	(67,531)	(152,992)	(13,700)	30,770	(741,513)
%	-24%	-49%	-24%	-49%	-40%	-4%	-7%	-33%	-56%	-5%	53%	-31%

Rank by Size Among US-AEP Countries

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam
1995-1999	1	4	8	2	11	7	10	6	5	3	9
1995	2	5	8	1	11	7	9	6	4	3	10
1999	1	5	9	2	11	7	10	4	6	3	8

US Export Value

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	220,251	56,878	74,288	417,379	3,045	109,189	88,911	197,490	151,299	381,393	9,253	1,709,377
1995	40,885	10,249	13,229	110,484	710	14,208	14,361	35,948	26,227	56,664	1,000	323,964
1999	33,684	7,628	16,580	65,370	916	18,648	10,808	33,487	18,131	70,083	1,267	276,603

ExportGrowth1995–1999

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
$	(7,201)	(2,622)	3,351	(45,114)	205	4,440	(3,553)	(2,461)	(8,095)	13,420	268	(47,361)
%	-18%	-26%	25%	-41%	29%	31%	-25%	-7%	-31%	24%	27%	-15%

US Market Share

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	10%	5%	14%	21%	4%	17%	24%	22%	14%	26%	2%	16%
1995	9%	4%	12%	20%	4%	12%	22%	18%	10%	20%	2%	14%
1999	9%	6%	20%	24%	8%	16%	18%	25%	15%	25%	1%	17%

US Marke tShare Rank

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	4	4	4	2	8	2	2	2	2	2	7	2
1995	4	5	4	2	7	3	2	2	4	2	7	2
1999	5	4	1	2	6	3	3	2	3	2	7	2

Market Share Leader

	HK	Indonesia	India	Korea	Sri Lanka	Malaysia	Philippines	Singapore	Thailand	Taiwan	Vietnam	TOTAL US-AEP
1995-1999	Taiwan	Japan	Japan	Japan	Korea	Japan	Japan	Japan	Japan	Japan	Korea	Japan
1995	Taiwan	Japan	Japan	Japan	Ger	Japan	Japan	Japan	Japan	Japan	Ger	Japan
1999	Japan	Korea	US	Japan	Ger	Japan	Japan	Japan	Japan	Japan	Korea	Japan